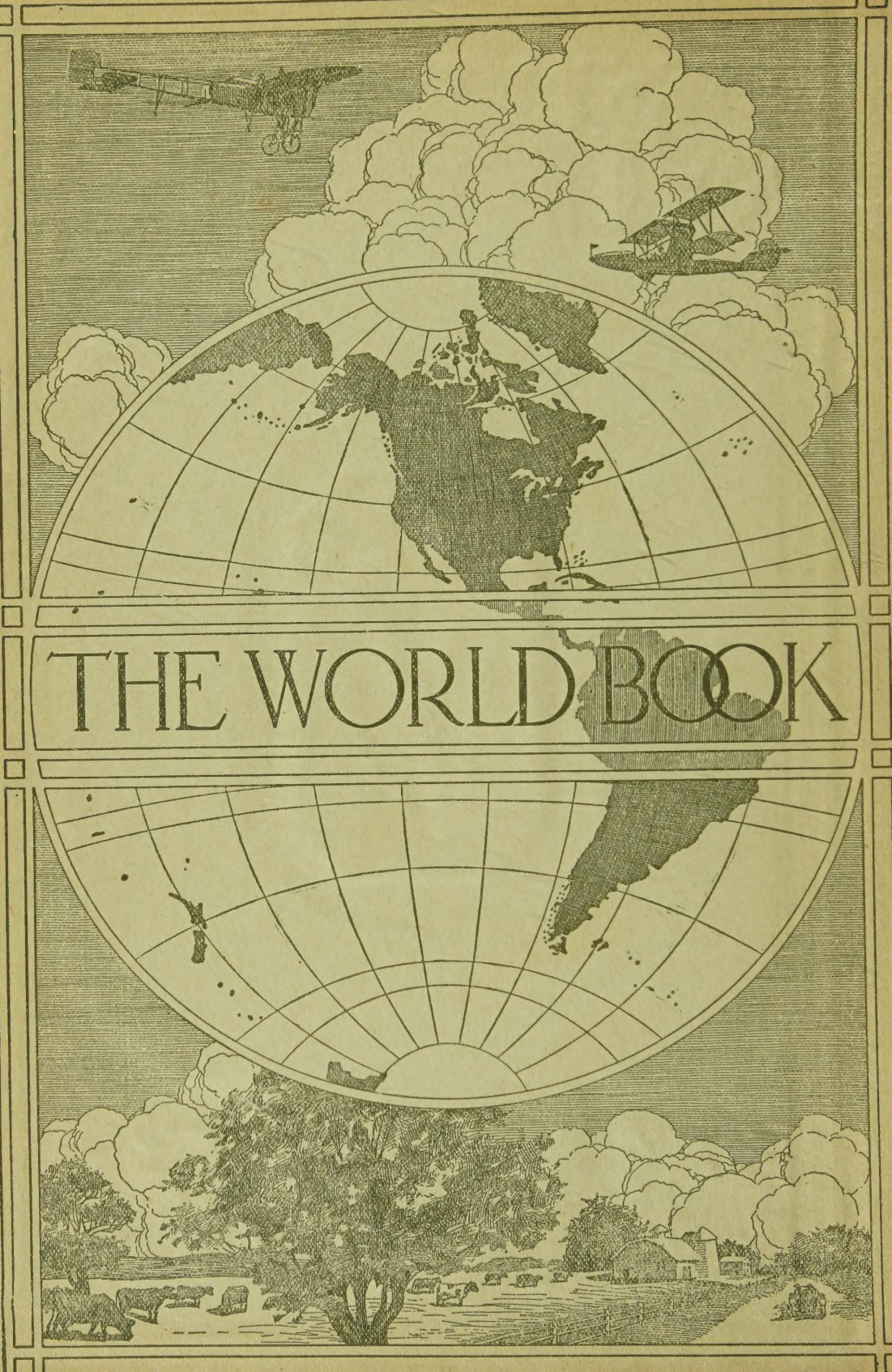

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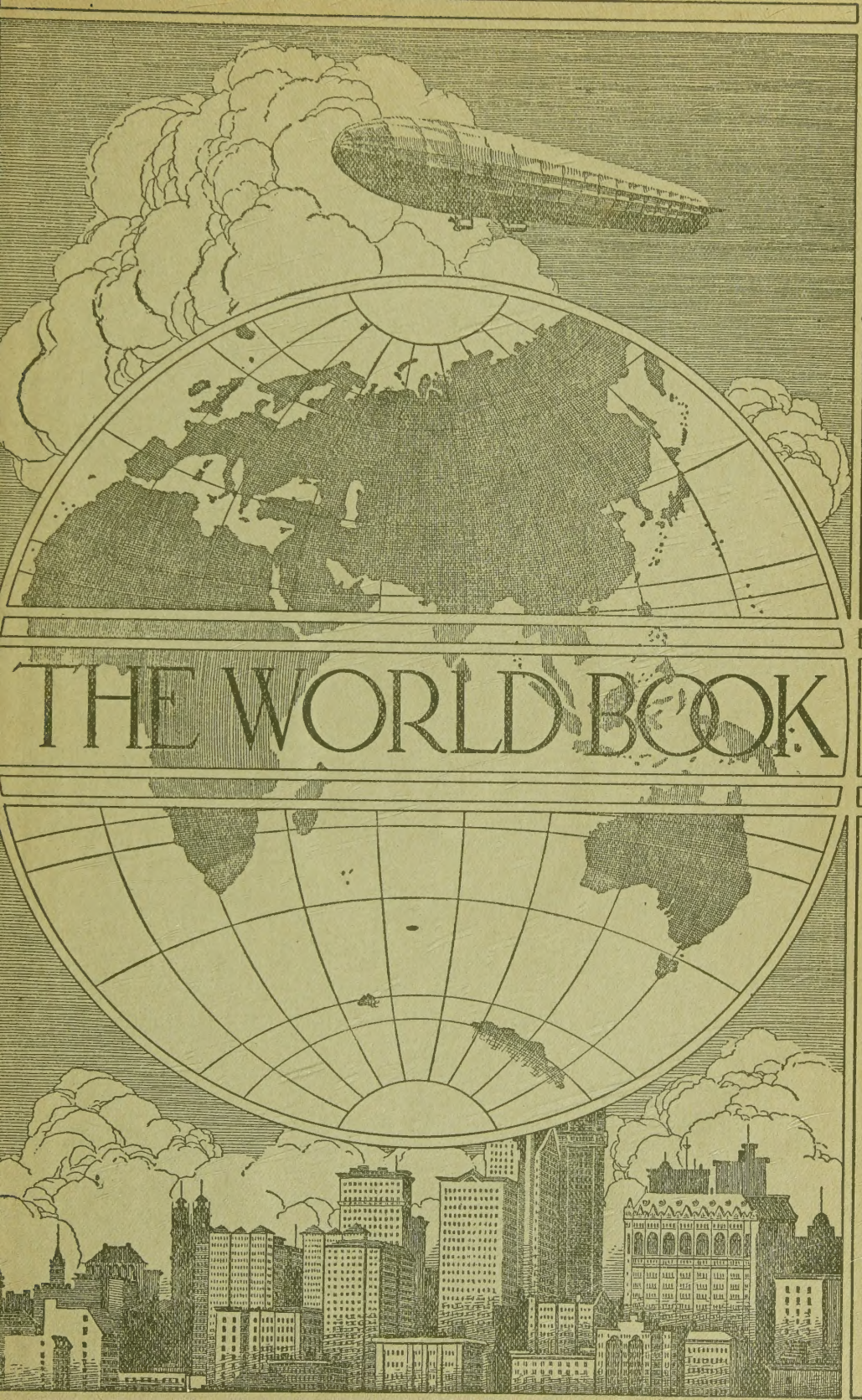
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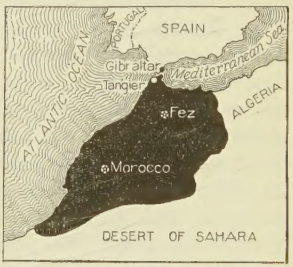
MORNING-GLORY, the common name of the hardy *Convolvulus,* a family of many varieties of climbing plants, having velvety, funnel-shaped flowers of variegated colors, and shades of purple, blue, pink and white. These fragrant blossoms are full blown in the morning, but cannot endure direct sunlight; the blossoms close soon after sunrise, to open again at the next dawn of day. The vine has a dark-green heart-shaped leaf, and grows at an astonishingly rapid rate, twining itself about anything near it and growing from ten to twenty feet high. It is extensively cultivated in country gardens, and as a screen to adorn fences, posts and verandas. In regions where it has been allowed to run wild, it is known as *bindweed.* The Japanese hold the plant sacred.

Wondrous interlacement!
Holding fast to threads by green and silky rings,
With the dawn it spreads its white and purple wings;
Generous in its bloom, and sheltering while it clings,
Sturdy morning-glory.
—HELEN HUNT: *Morning-Glory.*

MOROCCO, *mo rok' o,* a country occupying the northwest extremity of Africa, one of those backward parts of the earth that, after centuries of despotism and disorder, are permitting the European to set their house in order. Of recent years Morocco has been in the public eye because of the sharp rivalry among European nations for promising colonies. It touches Algeria on the east and is bounded on the north and west by the Mediterranean Sea and the Atlantic Ocean. On the south it reaches the Spanish Gold Coast and the wastes of the Sahara, in which its limits are not sharply defined. It comprises approximately 219,000 square miles, an area less than that of Texas.

The People and Their Surroundings. The population of Morocco is generally estimated at 6,000,000. There is almost no industry, though cattle, hides, wool, barley, wheat, eggs, almonds, flaxseed, beans and some other products are exported. In agriculture the most primitive of methods and implements are employed. The country is crossed from northeast to southwest by parallel chains of the Atlas Mountains. Though much of it is unsuited to cultivation, there are vast areas on the table-lands between the mountains and the sea that would be very productive if properly tilled. Pierre Loti calls Morocco an "empire carpeted with flowers," and Burton Holmes relates that the road from Tangier to Fez lies between "interminable beds" of wild flowers of every color. Most of this land lies fallow while the native Berbers cultivate the less productive soil in the slopes of the mountains. The Berbers constitute the most numerous part of the population and are to be found chiefly in the mountains, a rude and hardy stock. The plains are inhabited by the Arabs and the Moors, a people of mixed Berber and Arabic blood, and Arabic culture. In the towns the most energetic and progressive element is Jewish, which now has in its hands most of the foreign trade. The chief towns are Fez, the capital (63,000), Tangier (50,000), and Morocco (see next page).



LOCATION MAP

Government. Until recently Morocco was technically a sultanate. The sultan ruled as a despot, recognized as the chief of the state and the head of the religion, which is Mohammedan. As in most despotisms, anarchy flour-

ished. Taxes were arbitrarily imposed and ruthlessly collected. The system of justice was deplorable. France, hoping to incorporate Morocco in her vast African Empire, established a protectorate over most of the country, and induced the sultan to countenance certain reforms. A military police with French officers was organized. Germany and Spain for a time opposed French domination, but in 1911 Germany abandoned her claims in return for the cession of a part of French Congo, and Spain was given a protectorate over the Mediterranean coast. In 1921 a Moorish insurrection gave Spain much trouble. A space of 140 square miles about Tangier, the port opposite Gilbraltar, is internationalized.

History. Morocco in ancient times formed part of the Roman province of Mauretania, and when Rome's power declined, it experienced the vicissitudes of the other African provinces. It was overrun by the Arabs in 682, reduced to submission and forced to adopt the Mohammedan religion. The chief dynasties in the centuries that followed were the Almoravides and the Almohades. It participated in the conquest of Spain, and during the latter part of the Middle Ages, when the Moorish power began to weaken, it was largely from Morocco that fresh contingents were drawn for service in Spain. When the Moors were finally driven from Spain after the fall of Granada in 1492, many of them settled in Morocco. In 1814 the slavery of Christians was abolished, and the piracy which had led to constant friction with European powers was prohibited three years later. The invasion of Spanish territory by lawless bands resulted in a war with Spain in 1859. By the terms of peace Morocco lost territory and was forced to pay an indemnity of $20,000,000.

Consult Finnemore's *Morocco;* Edwards' *The Barbary Coast.*

Related Subjects. The reader is referred to the following articles in these volumes:

Arabs	Moors
Barbary States	Morocco
Berbers	Sultan
Fez	Tangier

MOROCCO, a city of North Africa, ninety miles from the Atlantic coast and 250 miles southwest of Fez, formerly a prosperous seat of Mohammedan learning. It is one of the capitals of the country of Morocco, and is favorably situated on an elevated plain about 1,500 feet above sea level, but there is little evidence of its former glory. A crumbling wall about seven and one-half miles in length encloses a city of narrow, crooked, dirty streets and shabby, one-story buildings, and though there are numerous gardens, open spaces and market places, the general aspect is one of dilapidation and extreme neglect. The Kutubia Mosque, one of nineteen Mohammedan churches, is almost the only stone building in the city. Another prominent structure is the Imperial Palace of the sultan, the buildings of which cover an area of 180 acres, encircled by a wall.

The manufacture of Morocco leather, formerly of much greater importance than now, is the only industry of note. Of the population, variously estimated at 50,000 to 75,000, a large number are Jews. There are not more than 500 European residents. Morocco was founded in the eleventh century, reaching the height of its prosperity about 1400. It then had a population of about 700,000. Civil wars and rebellions caused its decline, and its people are still turbulent and unruly.

MOROCCO, a choice variety of dressed leather, made from the skins of goats, and produced originally by the Moors in Southern Spain and Morocco, whence its name. From those districts the industry spread to the Levant, Turkey and the countries in North Africa bordering on the Mediterranean Sea. The characteristic qualities of genuine morocco are its elasticity, softness, fineness of grain and texture. Imitation morocco is now prepared successfully from the skins of calves and sheep, and is used in binding books, upholstering furniture and making fine shoes. See LEATHER.

MORPHEUS, *mawr'fe us,* in classic mythology, the name bestowed upon a minister of Somnus, more familiarly called the god of sleep. He is represented as an aged man with wings, pouring a vaporous narcotic from a horn.

MORPHINE, *mawr'fin,* or *mawr'feen,* a powerful and dangerous drug, in commercial form appearing in white, crystalline grains. Taken in small doses it will relieve pain; physicians occasionally prescribe very small quantities to induce sleep. Large doses are apt to produce unconsciousness or convulsions and sometimes result fatally. It must not be taken except upon expert medical advice, as a habit is easily formed which is exceedingly dangerous and difficult to overcome. Frequent use of the narcotic may cause loss of flesh and color, a weakened memory and a lowered moral standard. Recovery from the deadly effects of the drug is slow and tedious, but it is possible in time

for skilled physicians to restore victims of the habit to normal conditions. For medicinal purposes, morphine is usually administered in fluid form by hypodermic injection and is readily absorbed by the system. It is also a powerful emetic, and is an important principle in opium. It will crystallize in brilliant, colorless, odorless prisms. See NARCOTIC.

MORPHOLOGY, *mor fol' o ji,* the branches of biological and botanical science which deal with the form and structure of animals and plants. It investigates the development of animal and plant forms, rather than their uses, studies the life history of the organism as a whole and also of its separate organs, and traces the resemblances and differences between different forms. In the study of botany morphology is sometimes spoken of as *structural botany* (see BOTANY). The study of animal structure is the foundation of the science of physiology. It is by means of morphology that the material is obtained for all true systems of classification and arrangement.

The term was first employed by Goethe, and is from the Greek, *morphe,* meaning *form,* and *logos,* which means *doctrine.* He was the first to draw attention to the relations in form presented by living beings. Haeckel's work on the science of morphology is the most famous book on the subject.

MORRIS, CLARA (1849-), a celebrated actress who for many years stood, among women, practically at the head of her profession. She was born in Toronto, Canada, but at an early age commenced her stage career in the United States, as a member of a ballet. Her success in such plays as *L'Article 47, Camille* and *The New Magdalen* won for her an enviable reputation. In 1874 she married, and in private life is known as MRS. F. C. HARRIOT. After 1885 her long tours were infrequent, and much of her time was given to writing. Stories of children and of the stage are among her important literary efforts. A revival of *The Two Orphans,* with an all-star cast, brought her again before the public in 1904. She lives on the Hudson River, a few miles north of New York City.

MORRIS, GOUVERNEUR (1752-1816), an American patriot and statesman, who assisted in drafting the United States Constitution. He was born at Morrisania, N. Y., and was graduated from King's College, now Columbia University, in 1768. After graduation he studied law and in 1771 was admitted to practice. Four years later he was elected from Westchester County to the provincial congress of New York, and in 1776 helped to draft the constitution of New York State. From 1777 to 1780 he served in the Continental Congress, and in 1781 was appointed assistant superintendent of finance under Robert Morris, who rendered invaluable assistance in financing the Revolutionary War.

GOUVERNEUR MORRIS

As a delegate to the Constitutional Convention of 1787 he was actively on the side of Alexander Hamilton, and to him is due the chief credit for the literary form of the Constitution. Morris was appointed minister to France in 1792 by President Washington, and from 1800 to 1803 held a seat in the United States Senate. In 1810 he became chairman of the Erie Canal Commission. He published pamphlets on taxation and currency and also wrote political satires for newspapers. His life, written by Theodore Roosevelt, was published in the "American Statesmen Series" in 1888. A great-grandson, who bears his name, is a widely-known magazine writer of short, popular stories. (See below.)

Gouverneur Morris (1876-), a writer of clever short stories and novels, whose characterizations are taken principally from the wealthy leisure class. His literary style is delicate and bright, and his works are frequently illustrated by Howard Chandler Christy or J. C. Leyendecker. His home is in New York City; he comes of an old influential New York family, and is the great-grandson of Gouverneur Morris, one of the leading Revolutionary statesmen. He was graduated from Yale in 1898 and since then has devoted his time to literary production.

MORRIS, ROBERT (1734-1806), was born in Liverpool, England, but when a young man he emigrated to the English colonies in America and became famous as a financier of the Revolutionary period. He gave large sums of money to the government and risked great personal loss in the cause of his country. Through his financial assistance the campaign of 1781 became possible, resulting in the capture of Yorktown. He was a delegate to the Continental Congress in 1775 and signed the Declaration of

Independence in 1776. He established the Bank of North America in 1781 and later became a member of the first United States Senate. In marked contrast to his earlier success in finances, some of his later years were spent in a debtor's cell, owing to heavy speculations, but he was released by the bankruptcy law of 1802.

MORRIS, WILLIAM (1834-1896), an English poet and artist, and designer of the well-known Morris chair, was born at Walthamstow, in Essex. He was a most precocious child, reading the Waverley Novels at the age of four; yet he was fond of out-of-door life, and used to ride on horseback about Epping Forest in a toy suit of armor, acting out stories of his favorite heroes. At Marlborough School he failed to distinguish himself, but at Oxford he proved a real influence in his little circle. One of his closest friendships, formed in college, was with Edward Burne-Jones. Morris contributed to the *Oxford and Cambridge Magazine,* which was issued for a year at his expense; and in 1858 produced *The Defence of Guenevere, and Other Poems,* which possess the very spirit of medieval romanticism.

Although he had intended entering the Church, he decided upon architecture as a profession; with Burne-Jones and Rossetti he exercised his talents at painting, and finally found his real interest in the subject of house decoration. In 1861 he helped to found a company for the manufacture of artistic furniture and decorative articles, and thereafter devoted much of his time to this enterprise and to the art of bookbinding. In the meantime he continued his poetic production, chiefly of stirring narratives on subjects from ancient and medieval history. Notable among these are the *Life and Death of Jason; The Earthly Paradise; Sigurd the Volsung and the Fall of the Niblungs; The House of the Wolfings* and *The Story of the Glittering Plain,* these last two in prose and verse combined.

From 1885 until his death he was a strong advocate of Socialism, on the principles of which he wrote and lectured; and he was the personal friend of the workingmen of his neighborhood. It is for his far-reaching influence in improving the general taste in household furnishing that Morris is especially famous. His statement "I would have nothing in my home that I do not know to be useful or believe to be ornamental" states his doctrine.

Consult Noyes' *William Morris;* Cary's *William Morris, Poet, Craftsman and Socialist.*

MORRIS PLAN BANKS. A new type of bank has recently appeared in the United States, and is rapidly achieving importance. Its purpose is to lend money to "the small man," who, no matter how good his character, has previously been unable to borrow in times of need except from "loan-sharks," charitable organizations or friends. In Germany there are over 17,000 banks of similar purpose, in Italy nearly 1,000, and the greatest banks in France will lend sums even smaller than ten dollars. But, until Mr. Arthur J. Morris of Norfolk, Va., founded the first bank in 1900, there was probably no such institution in America. At first the Morris Plan spread slowly; at the end of October, 1914, there were only fifteen banks. But at the close of 1922 there were 102 banks in operation or being organized, and in December, 1922, loans passed the mark of $60,000,000 a year.

The average borrower of this type of bank has an income of $35 a week. Sometimes he wishes to repay other debts, and if he has been a victim of a "loan-shark" the bank will prosecute the usurer for him. At other times the borrower needs money for emergency expenses, or wishes to expand a small business. Suppose he borrows about $100; this he pays back at the rate of 2% a week, with bank interest. His note is indorsed by two men of his own station in life, who are notified as soon as he fails to make a weekly payment. Less than one dollar is lost in every thousand loaned under the Morris Plan, and only about twenty dollars in every thousand are paid by indorsers. Among the officers of the first New York bank are a former state bank controller, a former assistant secretary of the navy, two railroad presidents, the president of a large trust company and the heads of some of the best-known manufacturing companies in the country.

MORRISTOWN, N. J., the county seat of Morris County, is a wealthy residential town thirty miles west and north of New York City It is a favorite resort because of its beautiful location in the hills, and its healthful altitude. It is on the Whippany River and on the Delaware, Lackawanna & Western, the New Jersey & Pennsylvania and the Morristown & Erie railroads and an interurban electric line. The area is three square miles. In 1910 the population was 12,507; in 1920 it was 12,505—practically unchanged in ten years.

Practically the only industry is the cultivation of fruits and flowers (especially peaches and roses) and vegetables, which are shipped

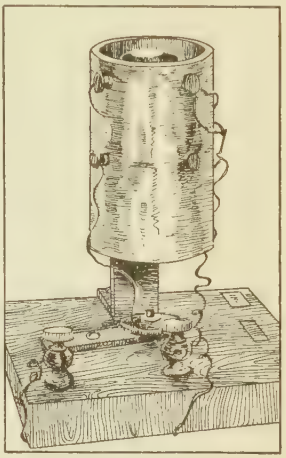
to the large markets. Among a number of fine public structures are the public library and lyceum building, the Federal building, erected in 1915 at a cost of $125,000, a Y. M. C. A. building, Vail Museum, constructed in 1916, at a cost of $150,000, Memorial and All Souls' hospitals and Randolph Military Academy. The site of old Fort Nonsense, constructed by Washington on a hill near the center of the town, is marked by a memorial monument. A soldiers' monument stands in the public square.

Morristown was settled in 1760 by Puritans, and in 1740 received its name in honor of Lewis Morris, then governor of New Jersey. During the War of Independence it was twice the headquarters of the American army under the command of Washington. The house which he occupied is still standing, and in it is a collection of relics owned by the State Historical Society. A part of the *Savannah,* the first steamboat to cross the Atlantic, was made at the old Speedwell ironworks, which in 1909 were nearly destroyed by fire.

MORSE, Samuel Finley Breese (1791-1872), an American who acquired fame through various notable achievements, but who will always be best known as the inventor of the electric telegraph. He laid the first submarine telegraph line in New York harbor, and he took the first daguerreotype made in the United States. His distinction as an artist was, perhaps, only a little less than that as an inventor. He was one of the best of the earlier American portrait painters, was one of the founders and the first president of the National Academy of Design, and for a time professor of the history of art at the University of the City of New York.

SAMUEL F. B. MORSE
His invention of the electric telegraph places his name high in the list of the world's benefactors.

It was during the time he was giving his attention to art that he conceived the idea of the telegraph. When his instruments were perfected he applied to his own government for financial aid to put them to a test, but his invention was ridiculed. Then he tried to interest foreign governments, but without success. He again applied to the United States for assistance and finally, in 1843, Congress appropriated $30,000 for the construction of a telegraph line from Washington to Baltimore. After many hardships, the line was completed on May 24, 1844, and the now historic words, "What hath God wrought?" were sent over the line as the first public message. Credit should be given Professor Leonard Gale and Alfred Vail, who were associated with Morse in his work, and to others who furnished material assistance in bringing the telegraph to success, but Morse was the inventor in the true sense of the word. No other American inventor has received greater honors than those later conferred on him by his own country and by foreign nations.



THE FIRST MORSE TELEGRAPH

MORTALITY, *mor tal' i ti,* Law of, a principle which determines what average proportion of the persons who enter upon a given period of life will die before they complete that period. The law has been obtained from a study of the records of mortality and an analysis of the experience of insurance companies. The resulting statistics have been formulated as *tables of mortality.* A table for the United States is given below, the number of individuals of each class considered being one hundred:

AGE	DEATH RATE	
	MALES	FEMALES
0 to 4	56.7	47.5
5 to 14	4.4	4.2
15 to 24	6.7	6.1
25 to 34	9.5	8.5
35 to 44	12.4	10.5
45 to 64	24.1	20.1

The following table shows the death rate for each of the Canadian provinces except New Brunswick, returns from that province not being available. In Canada the registration of births, marriages and deaths is under provincial control, and the rate for the Dominion as a whole has not been estimated:

PROVINCES		DEATH RATE PER 1,000
Prince Edward Island	1911	11.89
	1913	10.49
Nova Scotia	1911	16.73
	1912	14.34
	1913	14.52
Quebec	1911	17.92
	1912	16.15
	1913	17.33
Ontario	1911	12.63
	1912	12.56
	1913	12.70
Manitoba	1911	12.03
	1912	12.58
	1913	13.10
Saskatchewan	1911	5.54
	1912	6.29
	1913	6.58
Alberta	1911	9.69
	1912	9.71
	1913	9.09
British Columbia	1911	9.32
	1912	10.15
	1913	9.33

The average death rate is affected by such constant causes as race, climate, age, etc., and by such irregular causes as war, famine and pestilence. The tendency of mortality to diminish with the progress of civilization is now established by statistics. The average age of Americans at death in 1890 was 31.1 years; in 1900 it was 35.2, and in 1912, 40.6. The average annual death-rate per thousand in 1900 was 17.8, in 1919, 14.1. In 1919 the only important countries in the world having lower death rates than the United States were the following: Norway (13.7 per 1,000), England and Wales (12.9), Denmark (13.3), Holland (13.1), Australia (9.8) and New Zealand (9.6). Canada's rate is above. See EXPECTATION.

MOR'TAR, a vessel made of hard wood, stone, marble, pottery, glass or metal, in which substances are pounded into powder by the use

STONE AND GLASS MORTARS
With pestles.

of a pestle. Porcelain and glass mortars are used principally by druggists and chemists. In the early days the mortar of wood was a household commodity, being used when grain and seeds were pounded into meal and powder. The first mills, employed for the grinding of corn, were mortars made of stone and hard wood.

MORTGAGE, *mawr'gayj.* A farmer wants to increase the output of his farm by adding modern planting, cultivating and threshing machinery, but is short of ready money. A family owning a home has an opportunity to secure the adjoining lot at a bargain, yet cannot immediately produce the full purchase price. A husband and wife living in a rented flat decide to buy a home of their own, but have only a few hundred dollars in the bank to invest.

One way in which these people can carry out their plans is to arrange with some bank, real estate firm or private investor for a loan—amounting to only part of the property's value—giving a *mortgage* on the entire property as security for the repayment of the money. The mortgage is virtually a sale or transfer of the property to the lender, or *mortgagee;* but it differs from an actual sale in that the borrower, or *mortgagor,* remains in possession; and such tentative sale is canceled if, by the time specified, the debt is repaid with the interest agreed upon. This explains the derivation of the word *mortgage,* which is the French equivalent for *dead pledge.*

The Mortgage Deed. In a formal document, also called the *mortgage,* are set forth an accurate description of the property for purposes of identification, and a clear statement of the conditions of payment. There may also be clauses ruling the entire debt payable if mortgagor fails at any time to pay interest, taxes and assessments, as agreed, or giving the mortgagee power to sell without the formality of foreclosure proceedings, should the mortgagor be unable to repay the loan. This record, which must be filed at the county recorder's office, protects innocent third parties who might otherwise purchase the property for its full value without knowing there was a mortgage upon it.

Default and Foreclosure. In case the mortgagor is unable to meet the mortgage when it falls due, and fails to renew it, he is said to *default.* In former times this meant that the mortgagee acquired the property without further action, even though its value might far exceed the money due him. This was according to the common-law theory of mortgages, which considered the title to the property invested in the mortgagee. The modern interpretation is that the mortgagor is the true possessor and has a right to redeem until deprived of that privilege by formal foreclosure.

On the expiration of a certain period after the date of maturity—the length of time varying in different states and provinces—the mortgagee may file a *foreclosure suit,* praying the court to debar the mortgagor from his *right of redemption* in order that the mortgagee may have the return of his money. In some jurisdictions the mortgagee may foreclose simply by advertising the fact in the newspapers for a specified number of weeks; and in districts where there is no newspaper, this announcement may be made by nailing to the courthouse door a notice to the effect that the property will be sold on a certain date at public auction. With few exceptions, only *foreclosure by sale is recognized.* This means that the property is sold, and any surplus remaining after the claims of the mortgagee are settled is turned over to the mortgagor.

Mortgages as Investments. Real estate, since it is not removable, is the most reliable security possible, and for this reason people looking for safe investments buy mortgages from banks and real estate firms which made the loans originally. First mortgages are, of course, the most favored, since they take precedence over second and third mortgages when it comes to repayment through foreclosure proceedings. Where the property has depreciated in value the holder of a first mortgage is generally protected to the extent of his investment; the owner of a second or a third mortgage may lose part or all of what he has invested, for always the first mortgage is paid first. The rural credits system has greatly increased the number of farm mortgages within recent years (see Rural Credits).

Chattel Mortgages. A mortgage given on movable goods—called *personal property* or *chattels*—is known as a *chattel mortgage.* This may be given on any legal property, even on a planted crop not yet ripe or on a stock of goods which the mortgagor continues to sell and replenish. Where the holder of the mortgage has reason to feel that his security is unsafe, he has the privilege of taking possession of the property in a manner prescribed by law, subject to the mortgagor's right to redeem by paying debt and interest. L.M.B.

Consult Jones's *Treatise on the Law of Mortgages of Real Property;* Pingrey's *Treatise on the Law of Chattel Mortgages.*

MORTON, Julius Sterling (1832-1902), an American political leader and an ardent nature lover, who deserves credit for having established Arbor Day, a tree-planting day which now has a wide observance (see Arbor Day). He was also a pioneer newspaper man, having founded the Nebraska City *News,* the first newspaper established in Nebraska. At the time of his death he was editor of the *Conservative.* Adams, Jefferson County, N. Y., was his birthplace, but when he was two years old, his parents removed to Michigan. Julius received his early education in the Methodist Episcopal Academy at Albion, now Albion College. In 1850, at the age of eighteen, he entered the University of Michigan, completing his course at Union College in 1854. One year later he went to Nebraska to live. In 1874 at his suggestion Nebraska appointed a day for tree planting throughout the state, a custom which has gained strength with the years.

In 1856-1857 he served in the territorial legislature, the next year was appointed secretary of the territory, and for some time was acting governor. In 1866, and again in 1881, he ran as the Democratic candidate for governor, both times without success. From 1893 to 1897, under President Cleveland, he held the office of Secretary of Agriculture, a post he filled with highest efficiency. He spiritedly opposed William J. Bryan in Nebraska politics, and was allied with the gold-standard faction of the Democratic party. In 1901 President McKinley appointed him a United States Commissioner for the Louisiana Purchase Exposition. See full-page illustration, in article Nebraska.

MORTON, Levi Parsons 1824-1920), an American banker and statesman and former Vice-President of the United States. He was born at Shoreham, Vt., and was graduated from Shoreham Academy. In 1850 he removed to Boston and became a member of the firm of Beebe, Morgan & Co., merchants. He settled in New York in 1863 and founded the banking house of L. P. Morton & Co., which later became Morton, Bliss & Co., subsequently establishing branches and affiliated firms in London. In 1878 he was elected to Congress by the Republicans, and was reëlected in 1880. President Garfield appointed him minister to France, and he filled the post acceptably from 1881 to 1885. In 1887 he purchased "Ellerslie," his magnificent country estate at Rhinecliff on the Hudson River. He was elected Vice-President of the United States on the Republican ticket with Benjamin Harrison in 1888, and in 1895-1896 served one term as governor of New York state. After his retirement from official life he continued his business of banking and also became identified with large insurance interests.

MORTON, Oliver Perry (1823-1877), an American political leader, who, as governor of Indiana, rendered valuable service by his active support of the Federal government, during the trying period of the War of Secession. Born in Wayne County, Indiana, he studied law and was admitted to the bar in 1847.. Owing to his opposition to the Kansas-Nebraska Bill (which see), he left the Democratic party and became the first Republican candidate for governor of Indiana. He was defeated, but was elected lieutenant-governor in 1860, succeeding to the governorship the following year. He was re-elected in 1864. Three years later he entered the United States Senate. In 1876 he was a candidate for the Republican nomination for President, and the following year served on the electoral commission which decided the contest between Hayes and Tilden for the Presidency. See Electoral Commission.

MORTON, William James (1845-), an American physician who made a notable contribution to the progress of medicine and surgery by devising an electric current for producing the X-ray (see Roentgen Rays). He is the son of William T. G. Morton, the physician who brought ether into general use as an anesthetic. Dr. Morton was graduated at Harvard University in 1867, and in 1872 received his professional degree from Harvard Medical School. Thereafter he practiced in Maine, at Boston and at Kimberley, South Africa. Returning finally to America, he became editor of the New York *Journal of Nervous and Mental Diseases,* and in 1890 was appointed professor of nervous diseases at the New York Post-graduate Medical School. In January, 1913, he and Julian Hawthorne were found guilty of violating United States postal laws in connection with their exploitation of certain mines in Canada. Dr. Morton, after a few months' imprisonment, was pardoned by President Wilson and restored to full rights of citizenship.

MORTON, William Thomas Green (1819-1868), an American dentist, born in Charleton, Mass., the first man to bring ether into general use as an anesthetic. The first notable operation in which he made use of ether was performed by him in 1846, in the Massachusetts General Hospital. To him also is due the invention of many improved and painless methods in dentistry. After difficult, painstaking experiments he made known his successful results, only to have Doctor C. T. Jackson, a rival dentist, also claim the honor of the discoveries. Therefore the Montyon prize of the French Academy was awarded equally to the two. Dr. Morton, however, refused to accept his share. The American government utilized his invention, and he claimed a right to adequate payment. This was denied him, and he spent much of his later life in unsuccessful lawsuits and contests. See Ether; Anesthetic.

MOSAIC, *mo za'ik,* in its commonest application, is a floor or wall decoration made by fitting together in cement small pieces of hard substances, such as stone or glass. The material used distinguishes mosaics from *inlays* of

EXAMPLES OF MOSAICS

wood, ivory and the like. For floors of rooms, stone or cement shapes are commonly employed, usually in two or more colors. While this art is practical for the above purposes, it may also be used for decorative designs, colored glass and artificial stones being used. The workmanship in this branch of the art may be so accurate as to imitate paintings, tapestries, etc. Excellent reproductions of the paintings of artists have been executed in mosaic. Some of the finest effects in this art are to be seen in Saint Paul's and Saint Peter's in Rome, in Saint Mark's in Venice and in the Capitoline Museum in Rome. A branch of the art, known as *Florentine mosaic,* employs stones and shells in their natural color to make such articles as jewelry and personal ornaments.

MOSBY, *mohz'bi,* John Singleton (1833-), an American public man, who, though educated for the profession of law, won renown in the War of Secession as leader of an independent band of cavalry. He was born in Powhatan County, Va., graduated from the University of Virginia in 1852 and admitted to the bar three years later. At the outbreak of the war he left his practice in Bristol, Va., and joined the Confederate army. He served in the campaign of General Joseph E. Johnston in the Shenandoah Valley, and in 1862 became commander of "Mosby's partisan rangers," a company of horsemen who caused great damage by destroying supply trains and cutting communi-

cations of the Union armies. Several expeditions were sent out to capture him, and he was wounded several times, but he always evaded the enemy.

After the close of the war he established a law office at Warrenton, Va., and joined the Republican party. In 1876 he supported Rutherford B. Hayes for President of the United States, and in a public letter first used the phrase, the "Solid South," which remained for years a popular expression referring to the fact that all the Southern states were Democratic. From 1878 to 1885 Mosby was United States consul at Hong-kong, and after his return to America opened a law office in San Francisco. In 1904 he became assistant attorney in the Department of Justice in Washington, holding this position until 1910. His published works include *The Dawn of the Real South* and *War Reminiscences*.

MOSCOW, *mos'ko,* the second capital of Russia and the former residence of the czars, is the chief city of the province, or government, of the same name. Situated on the banks of the Moskva, 400 miles southeast of Petrograd, it is a little to the north of the most populous parts of Russia. Rich in traditions and filled with ancient monuments, it is a veritable storehouse of Russian archaeology. In its old churches it shelters holy relics and sacred pictures venerated by the entire people. To the pious Russian imagination, indeed, the sacred edifices grouped within the Kremlin are the very holy of holies.

The Kremlin is an ancient fort occupying a hill near the center of the city. It is described in an article under that title. Of the many sacred buildings within the Kremlin the most venerated is the ancient Uspenskiy Cathedral, which was built towards the end of the fifteenth century on the site of a still more ancient edifice. It contains the oldest holy picture in all "holy" Russia. The cathedral of the Archangel Michael shelters the tombs of all the czars down to the time of Peter the Great, and near by is a convent dating from the close of the fourteenth century which has served as the burial place of wives and sisters of the czars. Surrounded by the towers and turrets of this stately citadel is the "King of bells," the largest bell in the world (see Bell).

To the east of the Kremlin lies the portion of the city known as the Kitai Gorod (Chinatown), which still forms the commercial center of Moscow. About the Kremlin and the Kitai Gorod extends the so-called White City (Byely Gorod), the center of fashion, and beyond this again in a broad zone stretches the Earthen City (Zemlyanoi). The suburbs are more extensive than the city itself.

Not all the notable public buildings of Moscow are to be found in the Kremlin. The most striking building in the city is the Cathedral of Saint Basil, built in the sixteenth century; the Pokrovsky Cathedral is one of the architectural wonders of Russia. It is topped with towers all differing from one another and representing in their coloring pineapples, melons,

LOCATION MAP
Showing the network of Russian railroads which center in the city.

etc. Worthy of note also are the modern Church of the Saviour, the Palace, occupied in 1812 by Napoleon, and the town hall. Moscow is the seat of the Imperial University, founded by the Empress Catharine in 1755. It has a notable museum and a library of 300,000 volumes. Four thousand students are regularly enrolled.

Moscow is the chief industrial city of the country, and one of the great commercial centers of Europe. Six railroads converge upon it from all parts of European Russia as well as Siberia. These, with its position, make it the natural center for the internal commerce of Russia. The principal manufactures are textile fabrics, woolen, cotton and silk; but hats, hardware, machinery, leather, chemical products and spirits are also produced in large quantities.

The foundation of the city dates from the twelfth century, although the site was probably occupied long before. As the residence of the

metropolitan, or official of the Church next in authority to the czar, it was the center of the Russian religious world, and by the fourteenth century was also the capital of Muscovy. It remained the capital of the Russian Empire until Saint Petersburg (now Petrograd) was founded in 1703. The chief event in its turbulent history was the invasion by Napoleon in 1812 and the subsequent burning of the city to defeat him. After the bolshevist regime began in Russia (1918) the city of Petrograd became untenable for the revolutionists and Lenine moved the capital to Moscow, nearer the heart of the country. Population of the city in 1920, exclusive of the suburbs, 1,050,011. G.B.D.

Consult Zabyelin's *History of Moscow;* Grove's *Moscow.*

MOSELLE, *mo zel',* a river which rises in the Vosges Mountains, in the extreme northeastern part of France, and follows a winding course north and east, emptying into the River Rhine at Coblenz. It is about 315 miles long, and is navigable for small vessels for nearly 200 miles. The wines of the Moselle basin are famed the world over for their delicate flavor. Twice during the progress of the great War of the Nations the Germans followed the Moselle for nearly its whole length in their drives on Paris (see WAR OF THE NATIONS).

MO'SES, according to the Biblical account, was the great leader who by uniting the Hebrew tribes into a confederacy ushered in their national life. The story of Moses is told chiefly in the book of *Exodus.* As in the case of all great heroes of ancient times, legend has gathered around the personality so that it is not easy always to separate fact from fancy. People are fond of their heroes, and therefore, as they move further away from them in time, stories arise showing the strong attachment to them and the impression made by their careers. We cannot tell exactly when Moses lived because our means of calculating dates for the early periods of mankind's history are still imperfect. We may say roughly that he carried out his greatest work in leading the Hebrews out of Egypt about 1250 B. C.

The Hebrews belong to a large group known as the Semites, and at various times in Egyptian history Semitic tribes, whose home was in Palestine or in Arabia, migrated to Egypt, attracted by the high civilization that flourished there and the good opportunities for pasturing flocks. These foreigners were at times well treated by the Egyptian rulers, but often were pressed into service to build the great pyramids and the storehouses and other buildings in Egypt. The Biblical story relates that at the time Moses was born the Hebrews living in Egypt were very sorely oppressed, both by being obliged to do hard service and by living under very serious restrictions.

Childhood and Youth. The Bible story tells us that the Pharaoh at the time that Moses was born, fearing lest the Hebrews might increase too rapidly, ordained that all male infants should be cast into the Nile. The mother of Moses, when the little child was born, hid the babe for some months, and then, afraid of being discovered, made a little box of bullrushes and placed the babe inside of it among the reeds in the river. She asked her daughter to watch the box and see what would become of the boy. The daughter of Pharaoh on coming down one day to bathe with her maidens in the river, saw the little box and opened it. Filled with pity for the Hebrew child, she decided to save his life by raising him as her own son. The sister of Moses, who had been watching the scene, then came to the princess and said, "Shall I go and call to thee a nurse of the Hebrew women, that she may nurse the child for thee?" The princess agreed to this; Miriam brought her own and the babe's mother, to whom the child was thus returned home to be weaned and after that to be brought up at the court of Pharaoh.

This is the kind of stories that were told about Moses, and no doubt there were many others besides those found in the book of *Exodus* which have not been preserved. They are intended to illustrate the special providence that watched over the babe destined to be the leader of his people. Another story told to illustrate the sympathy and love of Moses for his brethren related how one day his anger was aroused by seeing an Egyptian beat a Hebrew. He turned on the Egyptian and slew him. The next day he saw two Hebrews fighting with one another and tried to separate them, when one of the two reproached him, "Dost thou wish to kill me, as thou didst the Egyptian?" Moses knew from this that his deed had become known and fled for his life. He wandered to the distant land of Midian and there took care of the flocks of a priest in that country, who was known as Jethro. He married Jethro's daughter.

Moses, the Leader. In order to explain how Moses came to undertake the task of bringing his oppressed brethren out of Egypt, a very

impressive story is told. One day while feeding the flocks of Jethro he saw a bush apparently burning without being consumed. As he approached to look more closely at the strange spectacle, a voice cried out from the bush and told him to go back to Egypt and lead his people out of the land of bondage into the promised land of Canaan. He must have accomplished a task of this kind, for otherwise, the stories would have no meaning at all. It is natural that so great an event should have made a lasting impression on the people who

STATUE BY MICHELANGELO
This famous *Moses* stands in the Church of San Pietro, Rome.

loved to dwell on the miraculous way in which, with the help of God, Moses saved the people from their oppression at the hands of the Egyptians. The stories are most dramatically told —how Moses, accompanied, according to a later tradition, by Aaron, appeared frequently before Pharaoh, imploring him to let his people go, and, when Pharaoh refused, bringing all kinds of plagues upon the country.

The last and most terrible plague, sent as a punishment because Pharaoh each time that some misfortune came promised to let the people go and then withheld his promise, was the killing of all first-born children in Egypt through the Angel of Death. This angel passed through the land, says the impressive story, and spared the houses in which Hebrews lived. Through the Angel of Death every household in Egypt was thrown into mourning, and Pharaoh finally felt obliged to yield. As though to make the story of the deliverance still more dramatic, Pharaoh is represented as having again regretted his decision, after the Hebrews had left, and pursued them to the Red Sea. Here a strange thing happened. Moses called to his people, when they saw the Egyptians in pursuit, "Fear not; the Lord shall fight for you." The Bible then relates that a strong east wind divided the waters and all the people marched over in safety; but when the Egyptians followed the waters rolled back and all of Pharaoh's horsemen were drowned in the sea. Thus the Hebrews were brought out of Egypt, and there is no doubt that it was Moses who accomplished this.

The Period in the Wilderness. We now have a series of stories in the book of *Exodus,* describing how the Hebrews moved from one spot to another, settling for a time in one place and then passing on. These accounts show that at the time the Hebrews were still in what is called the nomadic stage, somewhat like the modern Arabic Bedouins, who likewise move from place to place (see NOMAD LIFE). The Hebrews, however, had reached the stage when, in their wanderings, they were accompanied by their flocks, and it was the necessity of securing pasturage that led them frequently to change their place of sojourn.

Later on, after the death of Moses, we find the Hebrews entering the land of Canaan and, dispossessing the inhabitants, becoming tillers of the soil, or agriculturists. People who reach this stage of culture no longer move from place to place. They become bound to the soil, which they cultivate, and of which they become the owners. When people own land they must stay there to watch it and take care of it. The period between the exodus from Egypt and the conquest of Canaan is generally spoken of as the time of the wanderings in the wilderness, near and around a sacred mountain which was known as Mount Sinai. This period of the wanderings is put down as forty years in the Bible, which, however, is merely a round number to indicate an entire generation. Probably several generations elapsed, however, before Canaan became the land of the Hebrews. Im-

pressive accounts again appear in the book of *Exodus* about this period of the wanderings—how the people frequently grew impatient and, forgetting the hardships of Egypt, reproached Moses for having led them into a land where it would be so difficult for them to find subsistence.

Another Biblical story tells how the people on reaching Mount Sinai received a revelation of God himself amidst thunder and lightning, and how God made agreement between himself and his people whereby they were to worship only the God through whose help they were brought out of Egypt, and in return God would look upon the Hebrews as his own people. Moses was called by God to come to the top of the mountain, there to receive tablets of stone containing the laws which were to govern the people. While he was absent on this mission, the people, fearing that he would not come back, asked Aaron to make for them a golden calf, which they worshiped and around which they danced, looking upon the calf as though it were an image of God. This was against the teachings which Moses gave to his people, for their God did not want them to worship any image of anything in heaven, in earth, or in the waters under the earth. Very dramatically the scene is described—how Moses came down from the mountain and saw the people around the golden calf, became angry and dashed the tablets to pieces. It is interesting to see that sometimes accounts show that even Moses, the great leader, was not perfect. Because, on one occasion, he did not carry out an order of God in the way in which it was intended, he was told that he himself would never enter the promised land of Canaan. In accord with this promise, we learn that Moses as an old man ascended another mount, which was known as Nebo, from the top of which he could see the land of Canaan; there, gazing upon the land in which his people were to dwell and to pass through such strange and varying fortunes, at the age of 120 years, he died. The Bible adds that no one knows where he is buried.

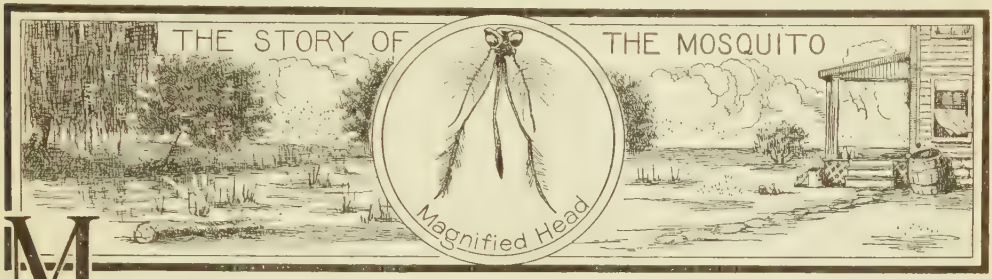
The Great Work of Moses. If we would sum up what we actually know about Moses, it may be said that through his career he created the Hebrew nation. That is to say, from him dates the beginning of the history of the Hebrews as a nation instead of a motley collection of clans or tribes with no bond uniting them except that of blood. Though centuries elapsed before the union between these tribes was so strong as to mold them into a single group, yet the work was begun by Moses, and what followed after his death was merely the further unfolding of the ideas which he gave to his people. It was through Moses that the people, abandoning the worship of other gods, looked upon Jehovah, or, as His name is probably to be read, *Yahweh,* as the only God.

Moses also began the organization of the people, and for this purpose gave them a body of laws which, enlarged as new conditions arose, with all kinds of interpretations of the laws and comments and illustrations to apply to certain cases, gradually grew into a very large series of laws traditionally known as the Laws of Moses. These laws, divided into a certain number of groups which to-day we call codes, and dating from various periods, are scattered throughout the books of *Exodus, Leviticus* and *Numbers,* while in the book of *Deuteronomy* we have still another code, gathering together about the middle of the seventh century B. C. all the laws of older and later days. So great was the influence exerted by Moses and so deep the impression made by him that for the Hebrews he became *the* lawgiver to whom, therefore, tradition ascribed all the laws by which the Hebrews were governed.

Moses thus stands before us as the great deliverer of his people, the organizer of the national life of the Hebrews, the religious teacher, and finally, the one with whom begins also the endeavor to regulate the relationships of individuals to one another by means of laws. The religious life of the Hebrews in the days of Moses, and long thereafter, was very simple. A sacred object which could be carried about was looked upon as a symbol of Jehovah, or Yahweh, and this sacred object was guarded by special attendants who afterwards, when the Hebrews in the land of Canaan began to build their little shrines and temples in the various places where they settled, became the priests. The organization of the priesthood is thus also traced back to the days of Moses, though we must remember that the priesthood did not become a large and important body until the days of Solomon, about 950 B. C., when the great Temple built at Jerusalem became the religious and political center of the country. M.J.

MOSQUE, *mosk,* a word which means to the Mohammedan what *church* means to the Christian—a place for prayer and worship. The first mosques were built with an open, rectangular court surrounded by colonnades. In the center of the court was a fountain for washing,

a part of the religious service. All Mohammedans turn toward Mecca when they pray, and so that they might know the right direction one of the walls surrounding the court was built at right angles to the direction of the building from Mecca. In this wall is a niche, called the Mecca niche. Here the colonnades were deeper, and the place was known as the sanctuary, or prayer chamber. Beside the niche in the wall was the pulpit and platform from which the Koran was read. Each mosque had at least one minaret, a tall, slender tower from which the muezzin called the people to prayer (see MINARET, for illustration). Later, mosques were covered by roof and dome. The mosque of Damascus is one of the earliest ever built, and that at Cordova, Spain, is one of the most famous.



MOSQUITO, *mos ke'toh.* If one wanted in a single sentence a character sketch of the mosquito, few better could be found than Kipling's famous line, "The female of the species is more deadly than the male." The mosquito has earned the reputation of being the deadliest of insects, and it is the bloodthirsty mother mosquito that has earned this reputation for the species. In spite of her diminutive size and harmless appearance, she is as fierce, for her size, as a tiger, and by carrying disease has probably caused more deaths the world over than the sum total of tigers, panthers, lions and other wild beasts that have preyed on men since the beginning of time. Her only weapon is her "bill," more slender than the finest sewing needle; yet with this innocent-looking weapon the mother mosquito in one branch of the family often starts epidemics of malaria. In another branch she may use it to bring on scourges of yellow fever, or the hideous, incurable disease known as *elephantiasis.* In the least dangerous species it is the weapon that is responsible for the vexatious "bites" that detract from our enjoyment of summertime.

Science, however, has unmasked the mosquito's true character, and now it is showing the world how to wage successful war against it. In time the mosquito will doubtless become extinct; this depends entirely upon the activity with which man is willing to combat the pest.

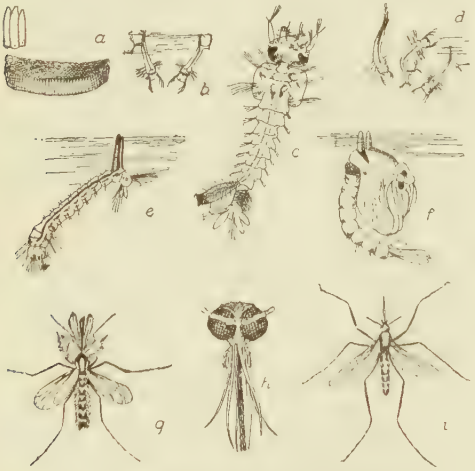
A Mosquito's Biography. In England and some other countries the mosquito is known as a *gnat.* It is a cousin of the common house fly—indeed, its very name is a Spanish word meaning *little fly*—and, like the other members of its family, it begins life with the egg. However, since it is a water insect in its early stages, the mother mosquito looks about for standing water when she is ready to lay her hundreds of eggs. Her wings are not strong enough to bear her more than two or three hundred feet from her own breeding place, but unless human beings are very careful about such things, it is not difficult for her to locate near them a home for her family. She will use a stagnant pool or puddle, a gutter, a lily pond, the weedy banks of a stream, a rain barrel, a trough or cistern, a tree hollow filled with rain water, an open drain, a pail or tub, or an old shoe, dish or can which has been thrown out and left to collect rain. The important point is that she must find *still water,* so the eggs will lie safely on the surface scum until hatched. From forty to four hundred are deposited, sometimes singly; but in the most common species they are arranged on end in small masses like rafts. (See illustration, *a*).

The Baby Mosquito, or Larva. It makes an interesting study to pour some water from a rain barrel or pool containing mosquito eggs into a jar, covering the opening with fine screening or mosquito netting and watching the hatching process. In a day or more, depending upon the degree of warmth and light, there will appear long, squirming *larvae* called *wrigglers* (*b, c, d, e* in the illustration). If one of these wrigglers is put with a little water into a saucer and studied through a magnifying glass, it will

be noticed that a pair of fine brushes on its head act like brooms, sweeping toward the mouth the tiny food particles in the water. This scavenger service of the wrigglers is the only useful thing the mosquito ever does in the entire course of its existence, and even that service is of little benefit to man.

The microscope will show that the tail is forked, one of the two divisions serving as a breathing apparatus. Every few minutes the larva comes wriggling up to the surface for air, assuming the strange position shown in the drawing (*b, d*), head down and breathing tube extending just above the water. If for any reason it cannot get air it drowns—which is an important point to remember. Several times during its wriggler stage—usually lasting from one to four days—the insect sheds its skin, and when it does so for the final time it has changed to a new form.

The Half-Grown Mosquito, or Pupa. The young mosquito has now reached the *pupa* stage *(f)*. A familiar name for it is *tumbler,* or *jumper,* in reference to its gymnastic habits. It is rather ungainly in appearance, with its



LIFE HISTORY OF THE MOSQUITO

(a) Eggs in mass, with enlargements above; *(c) (e)* larvae (young), or wrigglers; *(b) (d)* wrigglers breathing at surface of water; *(f)* pupa, or tumbler; *(g)* male adult; *(i)* female adult; *(h)* bill of female.

over-large head and two breathing tubes, like small horns, which now project from the thorax. As it no longer has a mouth, it cannot feed, but spends the time at the surface; disturbed, it swims swiftly down into the water.

The Adult Mosquito, or Imago. In a short time, generally after two or three days more, the skin cracks along the back and the full-grown mosquito comes forth *(g, i),* using its cast-off skin for support while it dries itself in the sun. The transformation is now complete, and the insect begins its adult life, generally from one to two weeks in length. Wrigglers, tumblers or full-grown mosquitoes which are born late in the season, and caught in the first cold snap, will lie dormant until the spring thaw enables them to finish their natural term of life.

How It Feeds, Hears and Smells. The bill or proboscis *(h)* of the female is a wonderful instrument and very fitly called a *stylet.* Under the microscope it shows that it is composed of six fine, extremely sharp needles which pierce the victim's flesh, and a slender tube through which the blood is sucked into the insect's mouth. Thus what we call a mosquito "bite" is not really a bite, but a puncture made by this daggerlike mouth; and the irritation is caused by a bit of saliva injected into the wound, presumably for the purpose of thinning the blood and so making it easier for the insect to draw it into her mouth tube. The male mosquito is provided with a bill that can suck but not pierce. The *bushy antennae* (feelers) on either side of his beak serve him for ears, and when the female sings her shrill song these feathery hairs inform him by their vibration that she is in his neighborhood. It was this familiar hum that inspired Bryant's lines, *To a Mosquito:*

Fair insect! that, with threadlike legs spread out,
And blood-extracting bill and filmy wing,
Dost murmur, as thou slowly sail'st about,
In pitiless ear full many a plaintive thing,
And tell how little our large veins would bleed,
Would we but yield them to thy bitter need.

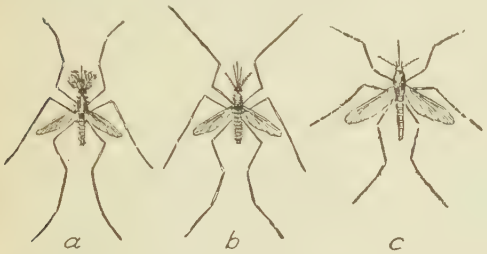
The feelers at the base of the beak in both male and female mosquitoes are believed to be the organs of taste and smell.

The Ordinary Tormentor. The common mosquito, whose attentions we find so annoying, but which—in America, at least—is not accused of the crime of spreading disease, belongs to the group called *Culex,* the Latin word for *gnat.* The nicknames are *gutter mosquito* and *rain-barrel mosquito,* out of compliment to its peculiar taste in the matter of residence. This mosquito is a true "citizen of the world," equally at home in mountainous lands and in low-lying seacoast regions, in Arctic countries during their brief summer season, and in temperate and tropical climates. Those in Alaska, Greenland, Kamchatka, and around the Lake of the Woods in Canada are particularly numerous. The *Culex* are a very prolific clan, multiplying so rapidly that as many as a dozen

generations are possible during the course of a long, wet summer.

The Mosquito that Carries Malaria. It is only since about 1898 that all the evidence has been gathered that has laid the responsibility for spreading malarial and other fevers at the door of the tropical mosquito with spotted wings, called *Anopheles*. This name comes from a Greek word meaning *hurtful,* but an equivalent for "murderous" would not be an exaggeration. Its bill has but one needle, yet with that one it does a thousand times more harm than the *Culex* with six.

The Romans gave the name *malaria (bad air)* to the fever that carried off their people

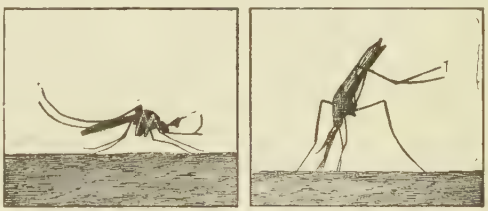


(*a*) Adult male *Anopheles* mosquito; (*b*) female *Anopheles;* (*c*) female, *Culex.*

by the thousands, because they believed it was caused by the poisonous vapors arising from the swamps and marshes that composed the great plain around Rome known as the Campagna. The night air was considered particularly dangerous; and doubtless in this ancient error may be found at least one source of the objection many people still have to sleeping with open windows. Physicians and naturalists, however, have proved that marshes are malarial simply because they offer a favorable breeding place for mosquitoes, and that the night air is dangerous only because the malarial mosquito chooses the nighttime to go food hunting.

Through countless experiments it was learned that when a mosquito has sucked into its mouth the blood of a person suffering from malaria, the saliva which it injects into the next person bitten will pass on the little parasite which is the germ of malaria. This much having been established, careful tests were then made to prove that the bite of the malarial mosquito is the only agency by which the malaria germ is transmitted. One such experiment was made in 1900, when two English physicians built a mosquito-proof house in the heart of the Roman Campagna and lived there through the rainy season. Since the mosquito seeks its food at night, they went indoors each evening at six o'clock, and although they took no other precaution neither contracted the disease. A further interesting experiment along these lines was carried out by sending a malaria-infected mosquito all the way from Rome to London and allowing it to bite a perfectly healthy subject, who was duly taken ill with the fever. Other similar experiments have been made, many of them in Cuba, Panama and Hawaii. Each one has only proved more conclusively than before that if all the mosquitoes in the world could be killed off, from egg to adult, there would soon be no more malaria.

The way to distinguish the malarial mosquito from other members of the mosquito family is by the fact that its larvae (young) remain at the surface of the water, and by the spotted wings and resting position of the adult insect. With head, body and tail in a straight line, it makes an angle with the surface on which it is resting; whereas in the other varieties the insect rests in a humpbacked position, with its abdomen parallel to the surface of support. It does not lay its eggs so promiscuously as the



At left, the *Culex* mosquito; at right, *Anopheles* mosquito. The latter always assumes the position shown when preparing to bite.

common mosquito, but chooses permanent pools or marshes. From this habit has come its popular name of *swamp mosquito.*

The Yellow-Fever Mosquito. To the scientists of America belongs the credit for trying and convicting the mosquito of the criminal act of transmitting yellow fever. The variety that carries this often fatal disease is the attractive silver-banded *Stegomyia calopus,* also called *Stegomyia fasciata* (Greek, meaning *fly with striped legs).* In 1900, while the American army was occupying Cuba after the war with Spain, a commission was appointed under Dr. Sternberg, surgeon-general of the United States army, to work on the yellow-fever problem in Havana. Tests were made with the inmates of two specially-built rooms. One room was a model of hygienic system, but mosquitoes which had bitten yellow fever sufferers were admitted, and six out of the seven patients con-

tracted the disease. The inmates of the other room occupied the same beds and wore the same clothing that had been used by yellow-fever victims, without any use of disinfectants. Although the only precaution taken was to exclude mosquitoes both day and night, not one person became ill. Thus was furnished positive proof that yellow fever is not contagious, but is spread by this particular mosquito. Tests have shown that it takes about two weeks after the mosquito is infected before it is able to convey the disease, indicating that the poison or germ undergoes special development in its body. See YELLOW FEVER.

There is another disease that this same mosquito is guilty of spreading, even more terrible than yellow fever because always incurable, although happily not so common. That is the repulsive affliction known as *elephantiasis*. After a mosquito has bitten a victim of this dreaded disease there is a period of three weeks before it is capable of passing on the infection. In some parts of the world the distribution of the disease is due to the agency of a certain species of the *Culex* mosquito.

The Tiny Mosquito and the Big Panama Canal. If it had not been for the destruction of the mosquito as a disease-carrier, it is doubtful whether the gigantic project of digging the Panama Canal could ever have been carried through. The greatest difficulty the French had to contend with in their attempt at its construction was the mysterious fever which carried off their workmen by the thousands. When the United States took over the task, the first thing the authorities put their hand to was sanitary work—making the Canal Zone a fit place in which to live. This required almost two years and cost millions of dollars. It was accomplished by Colonel (later Major-General) W. C. Gorgas, with the coöperation of the army, and its success has entitled him to equal honors with the great engineers who solved the purely mechanical problems.

Having learned the art of mosquito warfare during the yellow-fever fight in Cuba, Colonel Gorgas knew just what was needed. He and his "health squad" drove the mosquitoes out of the plague-ridden cities of Panama and Colon by a thorough campaign marked both by ambush and by open attack. They fumigated all ships, since mosquitoes are often carried by this means; they filled the drains, swamps and pools with the earth dug out of the canal; used petroleum to destroy the wrigglers in breeding places that could not be drained or emptied; installed modern sewer, garbage and water-supply systems; paved the streets; fumigated and screened the houses, killing all insects found indoors; and kept fever patients segregated, not necessarily from healthy people, but from mosquitoes. As a result of the vigorous measures enforced in the Canal Zone, the death rate from malaria and yellow fever is now actually lower than that of New York or Washington, and a mosquito is almost a curiosity. This conquest of the mosquito in the tropics is one of the great triumphs of the century. See GORGAS; PANAMA CANAL.

Campaign Methods and Weapons. The strongest weapon that can be used against the deadly mosquito is that of prevention, using the methods already discussed in connection with the campaign in Panama. This gets at the very root of the matter and is the only really satisfactory defense method. In addition to large-scale methods, however, it is necessary to educate the individual householder out of the careless habit of leaving rain-catching receptacles about the premises or in vacant lots. If the mother mosquito can find no near-by place to deposit her eggs, the problem is practically solved for that locality, as only a very small number of mosquitoes are carried by trains, boats, wagons or winds.

Against mosquitoes already hatched the chief weapon used is the oil can. If there is a thin film of kerosene over the surface of the water where they have hatched, the wrigglers are unable to project their breathing tubes through for the life-giving air, and thus drowning destroys a whole generation. It requires only a small amount of oil to film the surface—two tablespoonfuls (one ounce) for fifteen square feet—but the application needs to be repeated every two or three weeks during the mosquito season. This oil method, however, is only a protective measure, affording temporary relief. It cannot compare in effectiveness with the preventive method of destroying the breeding places altogether.

DRAGON FLY

A natural enemy of the mosquito. Do not molest it, for it is a beneficial insect.

The Mosquito's Natural Enemies. The dragon fly has acquired such a solid reputation as a mosquito foe that it has been nicknamed the "mosquito hawk." One of the best helps a community can have in its war on mosquitoes is a community

of these beautiful insects. Protecting them and encouraging their multiplication by artificial means is one of the plans now being developed. When fish are introduced into ponds and pools there is always a speedy decrease in the mosquito population; top minnows, sticklebacks, sunfish, bass, trout and baby perch are particularly good crusaders. The coöperation of frogs, toads, newts, turtles, bats and swallows is likewise worth encouraging. L.M.B.

Consult Howard's *Mosquitoes;* Mitchell's *Mosquito Life;* Ross's *Reduction of Domestic Mosquitoes.*

Related Subjects. The reader is referred to the following articles in these volumes:

Dragon Fly	Malaria
Elephantiasis	Pupa
Gnat	Yellow Fever
Larva	

MOSQUITO COAST, a district on the eastern coast of Nicaragua, extending along the Caribbean Sea for about 200 miles. From about 1655 to 1850 it was governed by a chief of the Mosquito tribe of Indians, but was under the nominal control of Great Britain. This region was for a time the subject of diplomatic controversy, as both the United States and the republics of Central America denied England's right to assume control. To avert any danger of war the Clayton - Bulwer Treaty (which see) was concluded in 1850 between the United States and Great Britain, but under a treaty ratified on August 24, 1906, the treaty of 1850 was annulled and Nicaragua was given the right to exercise absolute authority over the territory. It is now known as the department of Zelaya, and was so named for a Nicaraguan statesman. The chief town, which has about 5,000 inhabitants, is Bluefields. Population of the territory, about 15,000. See NICARAGUA.

LOCATION MAP

MOSS'ES, soft, green little plants, growing so close together that they make small green pads, or cushions. There are many hundred va-

rieties, some found in every part of the world, often growing where no other plant life can exist, "covering with strange and tender honor the scarred disgrace of time." They belong to the flowerless group of plants, and are related to the liverworts (which see). The mosses have tiny stems and true leaves, and their spore-bearing cups almost always open by a little lid. In the hot sun some mosses curl their leaves to protect the upper surface from the drying heat; when they do this they look quite brown and dead, but showers and cooler weather bring back their fresh greenness. Some mosses are so influenced by the dampness in the air that they turn a different color with every change.

Mosses are soil makers. Their small roots, working slowly, break off tiny bits of rock and in time make dust of stone, just as fine as if it had been mashed with a hammer. The leaves gather dust particles from the air, and these, with the dead tissue of the plant, make the soil deeper where the moss grows. In Lapland, mothers line the baby's cradle with moss, for it is so soft and warm. Some of the birds line their nests with moss. Frontiersmen use it to chink the cracks between the logs of their cabins. It makes an excellent packing material, and in some places it is burned as fuel. In Ireland are great peat beds, swampy places where peat moss grows; by a gradual process of filling in and sinking, this forms a hard material known as peat, which is much used for fuel. See PEAT.

Mosses live generally in damp and shady places, but they are found also where it is dry and warm. Their roots hold the rain as it falls in the ground, instead of letting it run off, and by keeping the ground damp, they encourage other plants to come and live with them.

MOTH, a beautiful insect, of which there are many species, all resembling the butterfly in appearance. It is distinguished from the butterfly by the *antennae,* or feelers; in the butterfly these are clubbed, while in the moth they are feathery and usually terminate in a point, but are never clubbed. The wings, when at rest, are horizontal rather than at an angle with the body, and sometimes reach an expanse of six or seven inches, displaying in some species the most gorgeous coloring. In most cases, though there are exceptions to the rule, the wings of the moth have a peculiar fastening, resembling a hook and eye, which is not present in the butterfly, and the bodies of most moths are thicker than those of butterflies.

Moths usually fly by night, as they are attracted by lights, while butterflies fly by day. The common, small white, mealy moth is called a *miller.* Another small moth, known as the *clothes* moth, is inconspicuous as to color, but very destructive to woolen fabrics.

Another variety of moth is found in the tropical countries and resembles the bee and the

MOTH AND BUTTERFLY

At left is a moth, at right a butterfly. The points of similarity can easily be noted in these two specimens. Not all moths so closely resemble the butterfly.

wasp. The moth known as the *silk-moth* is the only one of direct use to man, though a large number are of importance in destroying fruits, grains and vegetables when in their larval (young) state.

THE MOTH

The moth undergoes a complete metamorphosis. In the illustration all but the egg stage is shown; *b* is the grub, or larva; *a* is the cocoon, which encloses the pupa, and *c* is the adult moth.

Consult Holland's *Moth Book;* Dickerson's *Moths and Butterflies.*

Related Subjects. The following articles in these volumes will give much information on this interesting subject:

Antennae	Gypsy Moth
Brown-Tail Moth	Insect
Butterfly	Larva
Caterpillar	Metamorphosis
Chrysalis	Silk
Cocoon	Sphinx Moth
Codling Moth	Tussock Moth
Death's-Head Mot	

MOTHER GOOSE. Who Mother Goose was, not even the wisest man can say; but what she did for children, the smallest prattler in the nursery knows. They would miss something, indeed, were they deprived of "Ride a cockhorse," or "This little pig went to market," or "Hickery-dickery-dock." Where would they get their very first idea of rhythm and rhyme, where find their earliest "pieces" to speak, if Mother Goose had not left them "Little Boy Blue" and "Little Bo-Peep" and "Jack and Jill?" As nobody can say just who wrote these fascinating jingles, so nobody can explain exactly the charm which they have for children, but every child can feel it. It is different from the feeling roused by any other rhymes, no matter how simple, and almost any grown person who has been fortunate enough to be brought up on *Mother Goose Melodies* can, by repeating one of them, think himself back to the days in the toy-strewn, fire-lit nursery.

History. One thing that a child cannot realize is how many thousands, or even millions, of children have smiled and clapped their hands over the merry little verses; not just children in America, but in England as well; while the children in France and in Germany and in Russia have them, too, but in languages which children here could not understand. Nor is it only big brother or father or even grandfather when they were little who heard the *Mother Goose Rhymes;* children in England hundreds of years ago, before a white man came to America, knew and loved them, too. Perhaps, wonderful as it may seem, the little Shakespeare heard them, for some of them were certainly known in his day; perhaps their swinging music stayed in his head and when he grew up helped him to write the cheerful little songs which are found here and there in his plays.

Only in his day they were not printed in big picture books; they were not printed at all, or even written, but children learned them from their parents and passed them on to their own children, and so the verses lived. Finally it occurred to someone that they were worth printing, and in 1760 they appeared in London in a little book that would seem very unattractive to the children of to-day. Where the title came from no one can be sure, but it was probably taken from the name of Queen Goosefoot, a kindly personage in French legend who had a special fondness for children. More than sixty years before the *Mother Goose Melodies* appeared in London, a Frenchman, Charles Perrault, had used the name *Mother Goose* for a book which had in it such delightful stories as *Little Red Riding Hood, Puss in Boots, Cinderella, Beauty and the Beast* and *The Sleeping Beauty.* Since the first *Mother Goose Melodies* came out, there have been copies printed too numerous to count; never a Christmas season draws near without the bookstores placing in their windows new copies, each one more beautiful than the last.

Mother Goose Up to Date. Once in a while some very careful people declare that there are things in *Mother Goose* which ought to be changed; and they set at work to change them. A child shouldn't read, they say, of the lady who borrowed Dapple Grey and "whipped him and lashed him and rode him through the mire," so they change it to "she fed him, she petted him, she kept him from the mire," while of "Tom, Tom, the piper's son" who "stole a pig and away he run," they make a gentle boy:

> Tom, Tom, the piper's son,
> Picked a flower, and away he run;
> The flower was sweet
> And Tom was neat,
> And he went smiling down the street.

But these changes do not seem to appeal to average children. They want the fun of the old rhymes, even if it is sometimes a little rough; they prefer the squeal of the stolen pig to the scent of the dainty flower. Probably there cannot be found on record a child whose morals have been in any way injured by the frolicsome Tom or by the delightful Taffy, who "came to my house and stole a piece of beef." A.MC C.

MOTHER-OF-PEARL, or **NACRE,** the hard lining of shells of certain sea animals, such as the oyster, varying in color from pale grayish-blue and pink to deeper purple and green. Such shells are found off the coasts of tropical countries, particularly around the South Sea Islands, Panama, Cuba, Manila, Lower California and Australia, and are used extensively in the manufacture of pocketknives, buttons, beads, umbrella handles, and for inlay in fancy boxes and furniture. Long ago the South Sea Islanders used mother-of-pearl to make their fishhooks. This beautiful substance is excreted in exceedingly thin layers by the animal within the shell, and when it is the product of the larger mollusks is sometimes found in circular pieces a foot in diameter. See PEARL.

MOTHERS, NATIONAL CONGRESS OF. See NATIONAL CONGRESS OF MOTHERS.

MOTHER'S DAY, a day set apart every year —the second Sunday in May—in honor of motherhood. The wearing of a white carnation is the visible manifestation of the event, which is further celebrated by appropriate sermons in the churches and by family reunions.

The day was first suggested by Miss Anna Jarvis of Philadelphia; in a public meeting she crystallized the sentiment now back of its observance with the words:

In honor of the best mother that ever lived—your mother.

MOTHER SHIPTON, an English peasant woman, locally believed to be a witch and prophetess, who is said to have lived in Yorkshire about the middle of the fifteenth century. As she grew older her prophecies and perhaps her sharp tongue made her much feared. Her best-known prophecy is in a short, singsong poem that appeared about fifty years after her death. In it she said that "carriages without horses shall go" and that men would be seen in the air, which seemed prophetic of the automobile and flying machine.

MOTHERS' PENSIONS, the term generally applied to allowances made by the government for the support of mothers with dependent children. The fundamental purpose of such an allowance is to prevent the separation of the children from their mother because of poverty, or, in other words, to enable mothers who would not otherwise be able to do so to provide homes for their children. Although the existing legislation on the subject shows a great variety of details, the principles are nearly uniform. First of all, the mother must be in actual need, and under some laws she must actually be destitute. She must be a fit person, both physically and morally, to care for her children, and she must give most of her time to doing so. This means that under ordinary conditions she must not be regularly employed away from home. Furthermore, if she is receiving a pension, she must maintain a certain standard of living.

The first mothers' pension law was passed by Missouri in 1911; this law applied only to Jackson County, in which Kansas City is located. The bill passed in Missouri in 1915, extending the mothers' pension act to all counties, was vetoed by the governor and so failed to become a law. Illinois, in 1911, passed the first comprehensive law on the subject, and was followed in 1912 by Colorado. To-day more than one-half of the states of the American Union have more or less comprehensive acts providing mothers' pensions. In some states the law applies only to widows, or to those whose husbands are incapacitated in mind or body; in others to mothers deserted by their husbands, and in a few states also to divorced or unmarried mothers. The pension given to each mother depends on the number of her children. For the first child in California the rate is $12.50 a month ($6.25 by the state and a like amount by city or county); the amount is $2 a week in Iowa and $3 a week in Michigan; it is $15 a month in Illinois, Ohio, South Dakota and Washington. The mother is entitled to an amount varying from $5 to $12 a month for each additional child. The maximum age of a child for whom a pension may be received ranges from fourteen to eighteen. In most states the pensions are paid through the juvenile courts, but in a few cases through the regular county or other courts. J.C.L.

MOTION, LAWS OF. See DYNAMICS.

MOTIVATION, *mo tiv a' shun,* **OF TEACHING.** See TEACHING, MOTIVATION OF.

MOTLEY, *mot'li,* JOHN LOTHROP (1814-1877), an American historian and diplomat, remembered chiefly for his historical works on the Netherlands, the *Rise of the Dutch Republic* and *History of the United Netherlands.* He was born in Dorchester, now a part of Boston, and entered Harvard College when only thirteen. After his graduation in 1831 he studied at the universities of Göttingen and Berlin. He became intimately acquainted with Bismarck, with whom his friendly relations were continued in after life. On his return to America he studied law but soon ventured into literature, publishing a novel, *Morton's Hope,* in 1839. In 1841 he was appointed secretary of the Ameri-

can legation at Saint Petersburg (Petrograd), but resigned the office after a brief period.

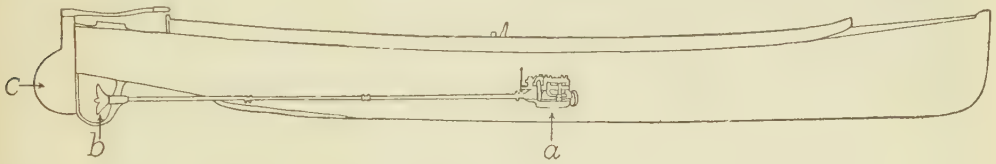
JOHN L. MOTLEY

A second novel, *Merry Mount,* a romance of the Massachusetts colony, was published in 1849, after which he decided that history, rather than fiction, was his chosen pursuit. In 1858 he went to England, where he received the degree of D. C. L. from Oxford. He was appointed American minister to the court of Saint James in England in 1869 by President Grant, but was recalled, for unexplained reasons, the following year. The last of his historical works, *The Life and Death of John of Barneveld,* published in 1874, was a rounding-out of the volumes previously written concerning the life history of the Netherlanders. Motley's scholarly treatment of his subject, his brilliant and picturesque style, and the spirit of liberty that animates his works give him rank among the most distinguished of American historians.

MOT'MOT, a handsome bird with plumage of blue, green and cinnamon, having the tail feathers much elongated and ending in racket-shaped tips. It is found in the western continents from Mexico to Brazil, and is sometimes called the *hoo-hoo,* from its cry. It is a bird of solitary habits, living only with its mate and keeping to gloomy forests. Its nest is built in a round hole at the end of a tunnel about six feet in length, excavated in banks along streams. The eggs are a glossy white or cream color, and number three or four. These birds are related to the kingfisher (which see). They feed on insects, reptiles and fruits.

MOTMOT

MOTOR, *mo'ter,* **BOAT,** a small boat propelled by an internal combustion engine or by electricity. Motor boating has been styled "automobiling on the water," and originally all motor boats were constructed for pleasure. Their popularity is due to the perfection of the gas engine (which see). Small pleasure boats are from twenty to forty feet, and large ones from forty to sixty-five feet in length. A small boat with a 12-horse-power engine may have a speed of ten miles an hour; with a 20-horse-power engine it may have a speed of sixteen to eighteen miles. Racing boats and large pleasure boats have more powerful engines. The best racers often attain a speed of thirty to thirty-five miles an hour, and a few boats have exceeded forty miles for short distances. The average pleasure boat, however, has a speed varying from five to ten or twelve miles an hour.



MOTOR BOAT
Showing location of engine (*a*), propeller (*b*), and rudder (*c*).

The essential parts of a motor boat are the boat, the motor, the fuel tank and the steering apparatus. The boat is so constructed that the bow is narrow and does not sink far into the water. The motor is placed low down and firmly fastened to the boat so as to give firmness and ballast to the entire structure. The propeller shaft slants downward, and may be attached directly to the motor, connected with it by a clutch. The motors are reversible, so that the boat can be moved forward or backward. The fuel tank is placed in the bow high enough above the motor to enable the fuel to flow to the cylinders without the use of a pump. The steering apparatus should be firmly attached to the boat, and easy to operate.

In the newest patterns of large pleasure boats the automobile type of engine is used and the steering apparatus is operated by a wheel similar to that used for steering the automobile. The space for passengers is often luxuriously furnished and a folding canopy enables the occupants to be protected from wind and storm.

A number of small, inexpensive motors so constructed that they can be attached to a rowboat or a canoe are on the market. By use of such a device any rowboat with a keel and rudder can quickly be converted into a motor boat that can be operated by any boy or girl old enough to row.

Commercial Uses. Although the motor boat was first designed for pleasure, its advent has had a marked influence on water transportation. It has nearly driven the small steamboat from the water, because the motor is much

MOTOR ATTACHMENT
A recent invention which converts an ordinary rowboat into a motor boat.

lighter, less expensive to operate, and because no licensed engineer is required. Moreover, lightening the weight enables boats propelled by the gas engine to navigate waters too shallow for a steamboat. For these and other reasons we find many small ferries and excursion boats in harbors and on lakes to be propelled by gas engines. The motor has also replaced the sail on most ocean fishing boats. The motor enables the fishermen to follow the fish, and to market their catch without depending upon the wind. In lobster fishing and oyster dredging this type of boat is also in general use.

History and Classification. A motor boat was exhibited at the Paris Exposition in 1889, and at the World's Fair in Chicago in 1893 a number of electric launches were in operation. The power for these launches was supplied by a storage battery; but the weight of the battery and the inconvenience of charging it made these launches impracticable, except in certain localities. A naphtha launch in which naphtha was used for fuel was developed at about the same time; but as the gas engine was perfected, the advantages of this style of motor brought it into general use.

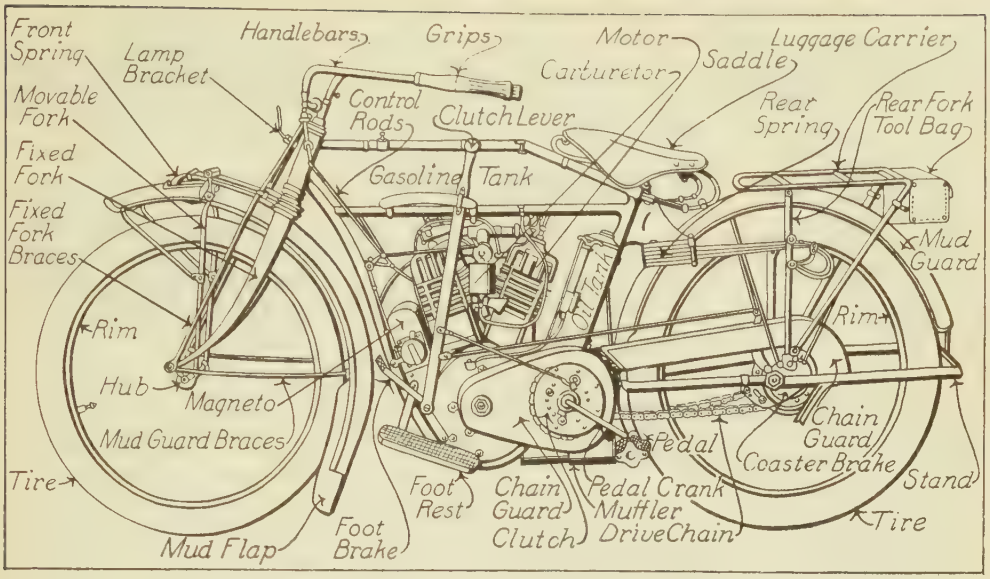
Four classes of boats driven by internal-combustion engines are recognized: (1) the pleasure launch, from twenty to thirty feet long; (2) speed boats; (3) the hydroplane, a type of speed boat partially supported in the water by planes attached to the hull; (4) the cruiser, which is virtually a pleasure yacht, sixty-five or more feet in length. W.F.R.

Consult Russell's *Motor Boats: Construction and Operation;* Hartford's *The Motor Launch: How to Build and Run.*

MOTORCYCLE, *mo'ter sy k'l,* a bicycle equipped with a motor. The engine, which is driven by gasoline, is constructed after the simplest design and made as light as possible. The first really successful machine was perfected in 1900, and the motorcycle is now so dependable that it is used for dispatch carrying in war, police service in cities, touring over country roads and other hard service. At the present time there are about fifty different makes of motorcycles on the American and Canadian markets. Many improvements have been added in the past decade, increased speed, comfort and durability being the qualities considered. The standard type is a 7-horse-power machine; those provided with levers giving two rates of speed are now generally regarded as superior to the single-speed type of machine. They will run from fifty to ninety miles on a gallon of gasoline, but the latter mileage can be achieved only under favorable conditions.

In the earlier experiments with motor-driven bicycles a belt was sometimes substituted for the chain drive. The belt is retained by some manufacturers, but the more recent tendency has been to restore the chain and to enclose it in a dust-proof case. Engines are of two types, single or twin cylinder, the twin cylinder predominating in the newer models. Magneto ignition is standard, and the machine is oiled by a mechanical pump. The automatic-ratchet type of engine starter has gained in favor.

Manufacturers are now concentrating their attention largely on increasing the comfort of operation. Cradle-spring frames and forks to absorb shocks have been introduced, and the footboards have been readjusted so as to form a natural leg rest. To lessen leg cramp, the wheel base is now lengthened. Not the least important improvement has been the installation of larger gasoline tanks, which make a wide range of travel possible. In fact, the tendency has been to give to the motorcycle as many of the advantages of the automobile as possible, and it may some day compete successfully with



PARTS OF A STANDARD MOTORCYCLE

the larger machines. The cost of motorcycles varies from $125 to $275.

The original form of the motorcycle of today was a steam-propelled velocipede invented in 1868. The boiler was suspended back of the seat in the center of the machine, and the piston rods were directly connected with cranks on the rear wheel. The idea was crudely carried out, but the principle involved was the same.

Racing. Mortorcycle racing has never achieved the great popularity that bicycle racing once enjoyed, but it has a loyal, if a smaller, following. The small tracks with sharp turns on which such races are often run, together with the great speed of the machines, make motorcycle racing a most thrilling sport. Unfortunately, drivers are frequently killed or maimed. Long-distance races are the commoner sort, since they afford a better test of the reliability of a machine and the skill of a driver. The record for one mile is 31.5 seconds; for 10 miles, 6 minutes 6⅛ seconds; for 50 miles, 33 minutes 55⅕ seconds; and for 100 miles, 1 hour, 8 minutes, 1⅘ seconds. The distance from New York to San Francisco, 3,296 miles, has been covered in 7 days, 16 hours and 16 minutes. G.B.D.

Consult Pagé's *Motorcycles, Side Cars and Cyclecars,* also his *Motorcycle Troubles Made Easy.*

MOTT, Lucretia Coffin (1793-1880), an American reformer and leader in the woman's-rights movement. She was born on Nantucket Island and educated in a school for Friends near Poughkeepsie-on-Hudson, N. Y. In 1818 she married James Mott, a teacher. As a leader in the Society of Friends she became noted for the refinement and eloquence of her discourses. When the Society of Friends divided into two factions in 1827, she and her husband joined the Hicksite, or liberal branch. She was one of the early Abolitionists and assisted in forming the American Antislavery Society for women in Philadelphia in 1833; in 1840 she was chosen a delegate to the World's Antislavery Convention in London, but was not allowed to take her seat on account of her sex. This action had an important influence in launching the woman's-rights movement, which was formally started by Mrs. Mott and Elizabeth Cady Stanton at a convention held at Seneca Falls, N. Y., in 1848. Mrs. Mott was president of the Pennsylvania Peace Society; she took a deep interest in colored people, and to the end of her life was actively interested in the promotion of temperance and in the elevation of women. See Abolitionists.

MOULD, the English form of the word Mold (which see).

MOULTRIE, *mohl'tri,* William (1731-1805), an American military leader in the Revolutionary War, famed for his brilliant defense of Charleston, S. C., in June, 1776. He was born in England, but early removed to South Carolina. He was captain of a regiment in the Cherokee disturbance of 1761, in 1775 he be-

WORK OF THE MOUND BUILDERS

(1) Mound, or circle, in Greenup County, Kentucky; (2) Mound with moat or encircling wall (diameter, 100 feet), West Virginia; (3) Serpent mound (500 feet long), Adams County, Ohio; (4) Cahokia mound (998 feet long, 99 feet high), Illinois; (5) Great mound, Marietta, Ohio; (6) Alligator mound, Licking County, Ohio; (7) Curve of hill and cross section of (6).

came a member of the Provincial Congress of his state, and was made colonel of a South Carolina regiment the same year. In March, 1776, he erected a fort on Sullivan's Island, commanding the entrance to the harbor of Charleston, and in recognition of his successful resistance to the attacks of the British army, under Admiral Sir Peter Parker, Congress gave the fort his name. He was shortly after made a brigadier-general, and in 1779 again defeated the British at Beaufort. On the surrender of Charleston, in 1780, Moultrie was taken prisoner, but was afterward exchanged for Burgoyne. In 1785, and again in 1794, he was elected governor of South Carolina.

MOUND BIRD, a bird belonging to the same group as the domestic fowl, whose name refers to its curious habit of building a large mound in which to hatch its eggs. This bird usually scratches up with its large feet a huge mass of grass, leaves and turf; in this heap the eggs are laid and hatched, the mound forming a crude incubator which is heated by the decaying of the vegetable matter. It is supposed that the young, on emerging from the eggs, dig their way out through the side of the mound. As soon as they leave the nest they are able to fly and to shift for themselves. The eggs are white when freshly laid, and are of unusual size, being from three to four inches long. The same mound is used season after season, and as fresh material is added at breeding time, the older nests are often of huge size.

The mound birds dwell along the seacoasts and on the banks of streams in Australia and the neighboring islands. They are modestly garbed in dull-colored plumage, and vary greatly in size. The smallest are about as large as a small fowl; the larger attain the size of a small turkey. All have unusually large feet, similar in structure to those of the pigeon. These birds are commonly known in Australia as *jungle fowl;* a familiar species inhabiting New Guinea is known as the *brush turkey.* The flesh of the mound bird is used as a table food.

MOUND BUILDERS, the name given to people, supposedly of the Stone Age, who preceded the Indians in North America. Chiefly because of differences in the formation of the skull, the Mound Builders are generally believed to have been a race separate and distinct from the Indians, and not their ancestors. The Mound Builders get their name from the fact that it was they who built the curiously-shaped mounds of earth which are scattered all over the United States but are especially numerous in the valleys of the Mississippi River and its branches. It is only by these mounds that we possess any knowledge of the people. Both Mound Builders and Indians are known by the general term *Amerind.*

It is estimated that there are more than 10,000 of these earth mounds in Ohio alone. They are of all sizes and shapes—circular, square and even eight-sided. The very large mounds are interesting because they represent an immense amount of labor. This means that the people who built them must have settled in that section for a considerable period, although they are believed to have been, very largely, a wandering race. One of the largest, Grave Creek Mound, in West Virginia, is about seventy feet high and 900 feet in circumference. Two human skeletons found deep underneath this mound indicate that it was built as a burial monument.

A mound at Cahokia, Ill., rises up in terraces to a height of ninety feet and covers about

twelve acres of ground. Another mound in Ohio is about 200 feet across and is surrounded by a ditch thirteen feet wide, evidently a fortification of some sort. This mound is shaped like a great snake, with its tail coiled and its jaws wide open. It is more than a quarter of a mile in length; the body is thirty feet wide and the wide open jaws are seventy feet across. In Wisconsin there are a large number of mounds shaped like serpents, birds and animals—buffalo, elk, moose, deer, wolves and panthers. Some of the panthers have tails 350 feet long and some of the eagles, the "thunder birds" of the old Indian legends, measure 1,000 feet from tip to tip of wing.

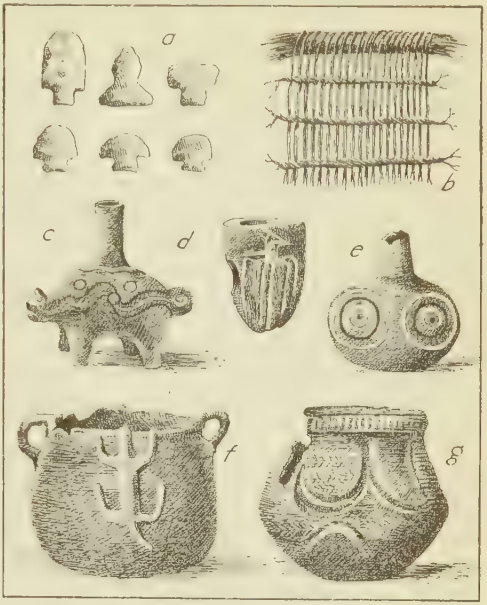
MAP OF DISTRICTS

In the various regions inhabited by the Mound Builders their mounds appear to have been constructed for different purposes. The best authority classifies them as follows:

(1) Effigies
(2) Rock Effigies
(3) Stockades
(4) Enclosures, altars, etc.
(5) Stone graves
(6) Lodge circles
(7) Pyramids
(8) Beehive tombs
(9) Shell mounds

These mounds were obviously built for a number of different purposes—some for fortifications, some for altars and some for monuments, while others were simply the foundations for houses. It is believed, also, that they were built by a great number of wandering tribes throughout a long period of time. All of the relics found within and around these mounds tell their story of the people who used them. The sharp flint axes and hatchets tell us that the Mound Builders were able to cut down trees and shape and work the wood. The arrowheads and hunting knives and sharp bone needles tell us that they killed and skinned wild animals, ate their flesh and used their pelts for clothing. Their hoes and spades and household utensils disclose their practice of agriculture. The ornaments of beaten copper and iridescent shell, ornamented with drawings and carvings, tell us that these savage tribes had developed some feeling for beauty, too.

Mines and stone quarries from which they got materials for their weapons, utensils and ornaments have been discovered in several places. On Isle Royale, in Lake Superior, there is a copper mine which was worked hundreds of years before Columbus discovered America. The abandoned pits and trenches of this mine were filled with rude mining tools made of chipped stone. A flint quarry was discovered in Arkansas from which thousands of cubic yards of stone had been taken with no other



FOUND IN THE MOUNDS

(*a*) Flint hoes from Tennessee
(*b*) Cloth from Ohio
(*c*) Pottery from Arkansas
(*d*) Eagle pipe from Ohio
(*e*) Pottery from Missouri
(*f*) Pottery with salamander from Ohio
(*g*) Pottery from Iowa

implements for the work than those which had been chipped from the rock which they later splintered. Another quarry in the Indian Territory had furnished them with a chalky kind of flint from which they made beautifully-shaped hoes and other tools and long, slender knives. A third quarry in Ohio supplied a beautifully fine-grained flint for spear- and arrowheads.

From where the Mound Builders came, how long they occupied American territory, and their ultimate fate are unknown. A.C.

Consult Nadaillac's *Prehistoric America*

MOUNDSVILLE, *mounds'vil,* W. Va., a thriving manufacturing and shipping center and the county seat of Marshall County, situated on the west side of the narrow strip of the state which extends north between Ohio and Pennsylvania. It is on the Ohio River, twelve miles south of Wheeling, with which it is connected by an electric railway, and is on the Baltimore & Ohio Railroad. Its population was 8,918 in 1910, and 10,699 in 1920 (Federal census). The area exceeds two square miles.

The most interesting feature of the city is a cone-shaped mound seventy-five feet high, a relic of the Mound Builders (which see). When excavated in 1838 it was found to contain burial vaults, skeletons and copper ornaments. The city has a Federal building, courthouse and Reynolds Memorial Hospital, and is the seat of the state penitentiary. It is a commercial center of the surrounding agricultural and coal-mining region, and in 1920 had 50 manufacturing establishments, capitalized at $6,208,000. The value of the products in that year was over $6,773,000. The town of Moundsville was platted in 1831 a short distance from Elizabethtown, the older settlement. The two places were united under the name of Moundsville in 1866.

MOUNTAIN, *moun'tin,* a huge elevation of the earth's surface, constituting the noblest feature of the landscape. In structure a mountain is either a fold in the rocky envelope of the globe, or a mass of immense blocks of stone, broken and partly upturned. Mountains usually occur in systems, which are often of great extent, several of the more imposing exceeding 4,000 or 5,000 miles in length.

Mountains speak to the scientist of the gigantic grindings and twistings which the earth's crust underwent in very ancient periods. Sometimes they resulted from a single fold, sometimes from several. But the majestic peaks of the Alps were produced by a less regular upheaval, for the strata are crushed and broken as if they had been crumpled in a Titanic fist. The process of folding is usually very slow, as is proved by the fact that rivers flowing across the folds will often cut their channels downward quite as fast as the rock is pushed upward. Lofty systems are thus traversed by streams, which would have been turned aside if they had dug their channels more slowly. Mountains usually show a core of granite covered with strata of sedimentary rock. Not all ranges are formed by folding. The ridges in the Great Basin of the United States, for example, are composed of great blocks of sedimentary rock that have been crushed and tilted. Still others are of volcanic origin.

The loftiest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,002 feet above sea level. The elevation of mountains is usually determined by the barometer, by noting the boiling point of water as it is carried upward, or by the use of surveying instruments and computations in trigonometry. The last is the most scientific method.

Consult Geikie's *Mountains, Their Origin, Growth and Decay;* Suess's *The Face of the Earth.*

Related Subjects. The following important mountain ranges and individual peaks are described under their proper headings in these volumes:

AFRICA

Atlas
Kilimanjaro

ASIA

Altai
Ararat
Caucasus
Elburz
Everest, Mount
Fujiyama
Ghats
Himalaya
Hindu Kush
Karakorum
Kuen-Lun
Lebanon, Mountains of
Nebo, Mount
Olives, Mount of
Stanovoi
Tabor, Mount
Taurus
Tian-Shan
Ural
Yablonoi

EUROPE

Alban
Alps
Apennines
Athos, Mount
Ben Lomond
Ben Nevis
Black Forest
Carpathian
Caucasus
Cenis
Cevennes
Cheviot Hills
Etna
Grampian Hills
Harz
Helicon
Jungfrau
Jura
Matterhorn
Mont Blanc
Monte Rosa
Olympus
Parnassus
Pyrenees
Riesen-Gebirge
Saint Gotthard
Sierra Nevada
Ural
Valdai Hills
Vesuvius
Vosges

NORTH AMERICA

Adirondack
Alleghany
Appalachian
Assiniboine, Mount
Berkshire Hills
Black Hills
Black Mountains
Blue Ridge
Cascade Range
Catskill
Coast Range
Columbia
Cordillera
Cumberland
Green
Holyoke, Mount
Hood, Mount
Hooker, Mount
Iron Mountain
Katahdin
Laurentian Plateau
Logan, Mount
McKinley, Mount
Ozark
Pike's Peak
Popocatepetl
Rainier, Mount
Rocky
Saint Elias
Selkirk
Shasta, Mount
Sierra Madre
Sierra Nevadas
Stone Mountain
Taconic
Uinta
Wasatch
White
Whitney, Mount

SOUTH AMERICA

Aconcagua
Andes
Chimborazo
Cordillera
Cotopaxi

The following general articles will also be of interest:

Barometer
Erosion
Geology
Hill
Volcano

MOUNTAIN ASH, a tree belonging to the rose family, widely known throughout Europe and America. It bears crisp, green leaves, clusters of white flowers and red berries, and in the wild state seems to prefer a home in cold, unprotected mountainous places. It is sometimes found as a shrub, and rarely grows taller than thirty feet. Although it is ornamental its hard wood is useful for handles of tools and implements that are manufactured from the wood, and the scarlet berries which cling to its branches throughout the winter often furnish the chief food for the birds at that season. In Europe the mountain ash is known as the *rowan tree.*

MOUNTAIN LAUREL, *law'rel,* a species of kalmia, an evergreen shrub of the heath family, described under the title KALMIA.

MOUNT ALLISON UNIVERSITY, an institution for higher education, located at Sackville, N. B. By its charter the ultimate ownership of the university is vested in the General Conference of the Methodist Church of Canada. The direct management of its affairs is in the hands of a Board of Regents, which is also the supreme governing body of Mount Allison Ladies' College and Mount Allison Academy, affiliated institutions. Twenty-four of the regents are selected by the General Conference, eight by the Alumni Society, and four by the Alumnae Association of the Ladies' College. Twelve of the regents and the members of the faculty comprise the Senate, which controls educational matters, such as the framing of courses of study and the conferring of degrees. In its internal administration the university is strictly nondenominational, and many of its students, who number about 250, are not Methodists. Mount Allison was the first chartered college in Canada to admit women to all the privileges of regular courses and degrees.

Mount Allison was named for Charles F. Allison (died 1858), a resident of Sackville.

MOUNT CARMEL, PA., is a city of Northumberland County, in the rich anthracite coal fields in the east-central part of the state. It is 129 miles northwest of Philadelphia and seventy-one miles northeast of Harrisburg, and is on the Northern Central, the Philadelphia & Reading and the Lehigh Valley railroads. The population, about one-third foreign born, in 1910 was 17,532; in 1920 it was 17,469, a slight decrease.

Coal mining and shipping are the principal industries. There are manufactories of miners' supplies, cement blocks, shirts and cigars; there are also silk and planing mills, a packing plant, foundries and machine shops and wagon works. Mount Carmel was incorporated as a town about 1848, and was chartered as a borough in 1862. H.J.K.

MOUNT DESERT, a mountainous island, abounding in beautiful lakes, fourteen miles long and seven miles wide, in the Atlantic Ocean off the southern coast of Maine. In 1918 it became Lafayette National Park, by special act of Congress. Green Mountain, the highest point on the island, rises to a height of 1,535 feet. There are three convenient harbors, Bar Harbor, Northeast and Southwest, and many small towns and villages, the most noted being Bar Harbor. The latter is one of the most exclusive summer resorts in the United States.

The island was discovered by Champlain and settled by French Jesuits in 1608, their settlement, Saint Lawrence, being destroyed by an expedition from Virginia in 1616. Somerville, the oldest village on the island, was settled by the English in 1761. The permanent population is not quite 2,000.

MOUNT HOLYOKE COLLEGE, at South Hadley, Mass., one of the first colleges for women established in the United States. The institution was founded by Mary Lyon (which see) in 1837, as Mount Holyoke Seminary and College. It has borne its present name since 1893, when the seminary charter was given up. The purpose of its founder was to make it possible for girls of moderate circumstances to receive college training. Most of the students live in dormitories on the campus, where board and lodging may be obtained for $275 a year. The degree of B. A. is given to those completing two years of prescribed and two years of elective work. With college property valued at $2,256,000, and productive funds amounting to over $1,480,000, Mount Holyoke takes high rank among American colleges for women. The library, which has the use of a permanent fund of $10,000, an income increased by annual appropriations, contains over 58,000 volumes. The college has a faculty of about 140, and a student enrolment of over 800. It is the special object of Mount Holyoke College to combine with high scholarly ideals a strong influence for Christian character.

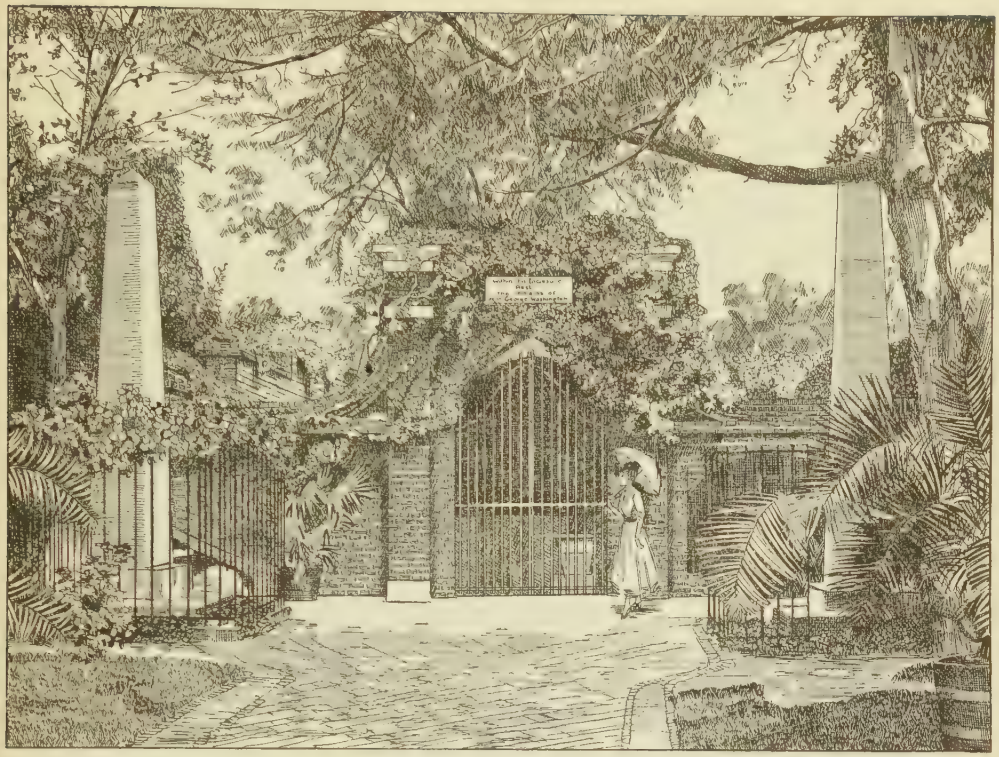
MOUNT STEPHEN, GEORGE STEPHEN, First Baron (1829-), a Canadian financier and railway promoter, first president of the Canadian Pacific Railway, whose completion was due in a large measure to his energy, foresight

THE HOME OF GEORGE AND MARTHA WASHINGTON

and faith in the future of Canada. Lord Mount Stephen was born at Dufftown, Banffshire, Scotland, but emigrated to Canada in 1850. He entered the employ of his uncle, who conducted a dry-goods establishment in Montreal, later became a partner, and after ten years purchased his uncle's entire interest. The firm expanded and engaged largely in the manufacture of woolen goods. Mount Stephen became very wealthy and extended his influence into other lines of industry. He was president of the Bank of Montreal from 1876 to 1881, and at the same time was successful in starting railways in Manitoba and Minnesota. From its organization until 1888 he was president of the Canadian Pacific Railway, in the construction of which he risked a large fortune. Its successful completion and operation greatly added to his wealth, of which he has since given freely for philanthropic purposes. One of his largest gifts was a donation of $500,000 for the Royal Victoria Hospital at Montreal. In recognition of his services in connection with the construction of the Canadian Pacific Railway, he was created a baronet by Queen Victoria in 1886, and in 1891 was raised to the peerage as Baron Mount Stephen. His title is taken from a peak in the Rocky Mountains which was named for him. In 1914 a statue of him was placed in the new Windsor station of the Canadian Pacific Railway at Montreal, to remind the people of the man whose financial and organizing genius linked the Atlantic and the Pacific with a band of steel.

LORD MOUNT STEPHEN

MOUNT VERNON, a shrine of American patriotism, beloved and sacred because of its associations with Washington, for it is memorable as the residence and the burial place of the "Father of His Country." The mansion house is situated on a high bluff overlooking the Potomac River, in Virginia, fifteen miles below Washington, D. C. It was the dearest place on earth to George and Martha Washington. Here Washington conducted his farm until called to command the Continental army; to Mount Vernon he returned after the Revolution and again after his terms as President; and here he lived happily in brief retirement as a private citizen until his death. In the unpretentious tomb near by this devoted couple were buried, the coffins being hewn from the



TOMB OF THE WASHINGTONS

same block of stone. Upon these England's great Foreign Secretary, Arthur J. Balfour, deposited floral tributes in 1917.

The mansion house is of wood, painted to resemble stone. It has two stories and an attic of dormer windows. Shaded lawns surround the home. There is a deer park under the hill, and to the rear are beautiful flower gardens and orchards. Disposed about the grounds are the usual outbuildings of a Virginia farm. Many of the trees which Washington cared for are still flourishing.

The mansion was built in 1743 by Washington's brother Lawrence, and was named after Admiral Vernon of the British navy. In 1856 the house and the surrounding property were saved from the auctioneer's hammer, and secured as a national possession by the Ladies' Mount Vernon Association. Portions of the original estate which had been sold were acquired again; buildings which had fallen into ruin were restored; the mansion was repaired, many articles of furniture and adornment were restored to the several rooms; and numbers of valuable relics and mementos of George and Martha Washington and of their times were placed in the house. To care for the mansion and grounds there was perfected a permanent organization, consisting of a regent and a vice-regent for each state in the Union. Thus the peaceful, lovely spot, upon which the memory of Washington sheds an eternal glory, has been preserved to a loyal posterity because of the courage and patriotic impulse of the women of America.

Excursionists from Washington to Mount Vernon are charged two dollars for the round trip by automobile companies, but electric street cars run from the national capital for a very small fare.

Consult Page's *Mount Vernon and Its Preservation.*

MOUNT VERNON, Ill., the county seat of Jefferson County, is a city in the south-central part of the state, seventy-six miles southeast of Saint Louis and 104 miles north and east of Cairo. It is on the Louisville & Nashville, the Southern, the Chicago & Eastern Illinois and the Wabash, Chester & Western railroads. The population in 1910 was 8,007; in 1920 it was 9,815 (Federal census). The area of the city is nearly three square miles.

Mount Vernon is the headquarters of the fourth appellate court district of the state, and

has an attractive appellate court and state library building, a Federal building, a Carnegie Library, and Highland Park, a playground of forty-two acres. Car manufacturing is the principal industry; the annual output is valued at $3,000,000. Other manufactures are cut glass, mattresses and hosiery. Farming and coal mining are the occupations of the surrounding country.

The place was settled in 1819, incorporated as a town in 1837 and became a city in 1872. K.S.

MOUNT VERNON, N. Y., a residential suburb of New York City, adjoining it on the north. It is in Westchester County, in the extreme southeastern part of the state, and is on the Bronx and Hutchinson rivers. The Grand Central Station in New York City is thirteen miles south, and New Rochelle is four miles east. Transportation is provided by the New York, New Haven & Hartford, New York Central and New York, Westchester & Boston railways. Electric lines connect Mount Vernon with New Rochelle, Yonkers and other cities and villages. The first settlement was made in 1851, and the city was incorporated in 1892. According to the Federal census, the population increased from 30,919 in 1910 to 42,726 in 1920, a gain of not quite forty per cent in the ten years. The area exceeds four square miles.

Mount Vernon is a city of beautiful homes, well-kept lawns and gardens, and broad, shaded streets; the Bronx Valley Parkway passes through the city. From Chester Hill, near the northeastern part of the city, a view of Long Island Sound is afforded. The Carnegie Library, the Lucas Building, Mount Vernon Hospital, the State Armory, Proctor's $300,000 theater and a $300,000 high school are the noteworthy buildings of the city. Although Mount Vernon is primarily a residential city, it has about fifty manufactories. R.O.G.

MOUNT VERNON, Ohio, the county seat of Knox County, is a city north of the center of the state, forty-five miles northeast of Columbus. It is on the Kokosing River and on the Pennsylvania and the Baltimore & Ohio railroads. The area is nearly two square miles. In 1910 the population was 9,087; in 1920 it was 9,237, nearly two per cent gain.

The State Tuberculosis Sanitarium, constructed at a cost of over $1,000,000, is located a mile from the city, near Hiawatha Park. The principal industries include Corliss-engine, locomotive and bridge works, foundries, cooperage and bent-wood works and manufactories for making plate glass and wood-working products. The city is near natural gas and oil beds and the river furnishes water power. Mount Vernon was settled in 1805, incorporated as a town in 1845 and became a city in 1853.

MOURNING. This term, as ordinarily used, refers not so much to grief for the dead, or for some calamity, as to the external, more or less conventionalized symbols of such grief. Almost every nation has had its special mourning customs. That of the Jews is described in the following verse:

> Mordecai rent his clothes, and put on sackcloth with ashes, and went out into the midst of the city, and cried with a loud and bitter cry.

The Greeks shaved their heads in token of grief, while the Romans, on the other hand, allowed their hair and beards to grow, and neglected their clothing. In more recent times in most nations more restraint has been practiced, and the signs of grief have been limited, in the main, to the wearing of certain colors. The Western nations have without exception adopted black, certainly the most gloomy of colors, as the mourning shade, but in many of the eastern countries white, yellow or even red is worn in times of bereavement.

In America the custom of wearing mourning is much less common that it was even a few years ago. Putting off of the mourning "weeds" less than a year after the death of a close relative was formerly considered a token of disrespect to the dead, but to-day the bad psychological effect of the gloomy, monotonous mourning color is clearly recognized.

MOUSE, *mous,* a little, gnawing animal of the same family as the rat, from which it is distinguished only by its smaller size. It is known everywhere in the world except in a few islands of the Pacific Ocean. The house mouse, originally from Central Asia, has followed man to all corners of the globe, and is still a regular traveler on steamboats, railroads and pack trains. In its characteristics, color and size, unlike other animals, it is the same the world over. It does most of its work in the night, coming forth from its nest within the walls or ceilings, or in the dark corners of the attic or cellar, to sample the milk, cheese, bread or other food left uncovered. Its large eyes and ears and long whiskers are suited for midnight

COMMON MOUSE

exploration, and to be "as quiet as a mouse" is to be noiseless. Like the squirrel, it holds its food in its front paws. Its long tail is believed to be useful in climbing and in jumping.

YOUNG MICE
Blind, pink and hairless.

Mouse color is so difficult to see that a somewhat similar gray is used for warships and for the uniforms of the German army.

The field mouse, meadow mouse and wood mouse live outdoors, or in barns or granaries. The hawks, owls and snakes are their enemies, and where these are exterminated the mice, multiplying rapidly, soon become a pest and destroy all the grain in the fields. The *jumping mouse* and some other outdoor animals called mice are of a different family (see JERBOA; VOLE; RAT).

How to Rid the House of Mice. It is practically impossible to have a mouseless house without a cat, even though the latter is not desirable. Covering the small holes in the floor and walls with metal may keep mice out of a new house, and traps may reduce the numbers in an old one, but their natural enemy, the cat, is their most serious foe. Poison is often left exposed on food for mice, but this method of extermination is not recommended; the animals die in the house in inaccessible spots, and there is always present the danger that little children may find the poisoned bits.

MOUTH, the cavity through which food is taken into the body, and which also has an important part in the formation of sound in talking and singing. The mouth opening is provided with a pair of lips which help us to drink and to pick up our food, and within the cavity are two sets of teeth, an upper and a lower, which serve to grind and crush the food into a pulp. In the walls of the mouth are located glands which secrete saliva. This fluid is mixed with our food as we chew it, and it helps in digestion. The top of the mouth, popularly known as its "roof," consists of a front bony portion called the *hard palate,* and, back of this, a soft part called the *soft palate.* The former serves as a partition between the mouth and the nose, and the latter, which arches down at the back of the mouth, forms a curtain between the mouth and the pharynx. The pharynx is a funnel-shaped sac which connects with the gullet, or food tube. Hanging down and slightly to the rear is a small cone-shaped prolongation of the soft palate, known as the *uvula.* The mouth cavity is lined with thin mucous membrane.

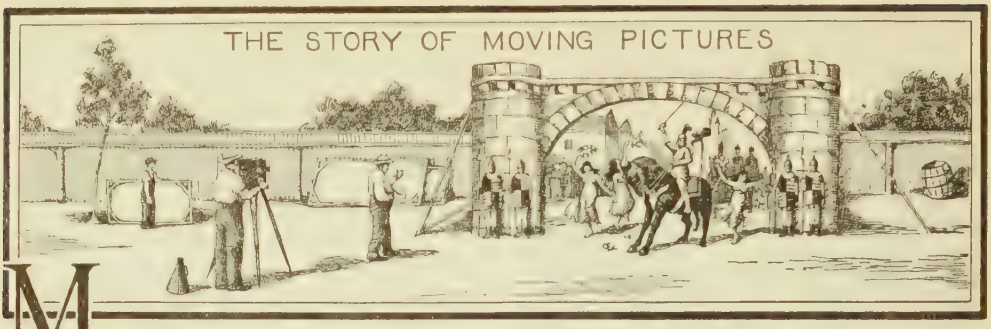
Extending from the floor of the mouth is a bundle of muscles, the *tongue,* one of the most useful organs in the entire body. It is flexible and movable, and during the process of eating it pushes the food between the teeth, moves it out of the sides of the cheeks, collects it into small masses and thrusts it into the food tube, through which it enters the stomach. Though the power of the voice is determined largely by the chest and lungs, the mouth, including the lips, has an important part in its musical quality and expression.

Care of the Mouth. Through the nose and mouth openings harmful germs find entrance into the body, and both of these cavities should be kept scrupulously clean that disease may be warded off. Because the mouth cavity is warm and moist all of the time it is an ideal breeding place for innumerable germs of every kind, and because it is lined with a thin membrane through which germs pass easily into the blood, an unclean mouth is a constant source of danger. Not only should the teeth be scrubbed thoroughly after each meal, but also the gums in which they are embedded. Diseased gums cause the loss of teeth from pyorrhoea and they also contribute to decay. The teeth should be brushed up and down (lengthwise) as well as crosswise, to remove every particle of food left in them. Daily washing of the mouth cavity with a mild antiseptic, such as diluted peroxide of hydrogen or other good tooth wash, is also advisable. W.A.E.

Related Subjects. The reader is referred to the following articles in these volumes:

Mastication	Teeth
Membranes	Voice

MOUTH ORGAN. See HARMONICA.



MOVING PICTURES. It is probably not an exaggeration to say that moving pictures are the most revolutionary invention since the printing press. Flying machines are more spectacular, the telegraph, the telephone and the sewing machine have a greater industrial value, but none of these can rank in educational importance with the moving picture camera. For, just as the printing press put books, once the exclusive possession of a privileged class, within the reach of every one, so have moving pictures put within the reach of every one a phase of knowledge that cannot be contained in books. There are ideas, of course, which cannot be communicated by means of pictures, but on the other hand there are things which can be communicated to large numbers of people in no other way.

Moving pictures can present to a child a vision of all the wonders of the universe in a language which he can understand, for they do not demand ability to grasp the contents of a printed page. They speak the simplest language known to man, a picture language. The cave men of France made drawings on the walls of their caves thousands of years ago, from which we of to-day can read their history. The Egyptians developed a picture language which speaks to us after the lapse of centuries. In moving pictures we have gone back, in a sense, to that most primitive means of communication and have translated it into a universal language. For pictures speak in every tongue; in them we have a language which enables people in any part of the world to tell their story to other human beings in every quarter of the globe.

New Worlds to Conquer. This does not mean that books have lost any of their value, but simply that books, indeed, life itself, can be made more interesting through the use of moving pictures. History and geography and natural history, science and industry, art and literature can be made more vivid and interesting by means of this invention. We study history to gain a knowledge of the world as it was before our time. This knowledge is locked up in books and historical documents, in the literature and art and architecture of the past. The moving picture producer can make use of every available historical source to reproduce a picture of a bygone age and bygone peoples. In one film he can present material that it would take one individual years to cover and which is not accessible to the average person in any form. *The Last Days of Pompeii* is a good example of such a film, and the effect of seeing this picture play is not only to gratify curiosity about a particular period, but also to stimulate it, so that one will want to know more and will go to books for this further knowledge of ancient peoples.

Filming Textbooks. Geography is the study of the surface of the earth as it exists to-day and of the plants and animals and human beings that live on that surface. The moving picture camera-man is bringing an intimate knowledge of this world to the smallest country town. There is scarcely a spot on the earth's surface which he may not visit, no jungle fastness nor barren Arctic wilderness which may not furnish materials for his camera. Much of the same material might be presented in still photographs, but until now such pictures have had so small a circulation that their production has not been commercially profitable. The moving picture theater has made them so. F. A. Talbot, an English writer, suggests that most of the so-called geographical films are merely "travel subjects" for the theater—an attempt to make a subject fit both the theater and the schoolroom. And this is doubtless true. Such films have, nevertheless, a very great value as a supplement to textbook explanation. But Mr. Talbot further insists that a whole textbook might be written in moving pictures which would present the subject far more graphically than could any book.

He uses as an illustration a lesson about rivers. He suggests that the source of a river in a spring, in the outflow of a lake or in the melting ice of a glacier, may first be shown; next would come pictures illustrating its growth, the inflow of tributaries, then the many sudden changes through which it passes—its rapids and falls and shallows, and all the varying force of its current. The pupil can be introduced to the use made of this waterway, the craft on its upper reaches and the traffic in which they are engaged, the steam and motor navigation on the lower reaches, when the river has broadened out into a mighty stream, and towns and cities begin to appear on its banks. Such a film would be expensive to produce and would require infinite labor, but its great value for school purposes ought to justify such an expenditure.

Natural History. The greatest success achieved so far by moving pictures in the field of education has been in connection with natural history. Many wonderful films of plant and animal life have already been made. Every one can study the living things in his immediate environment, but he cannot see all that the camera can see. Pictures of the bottom of the ocean with its strange plants and animals, pictures of the haunts and habits of birds and reptiles and other animals, which it has taken weeks and months to complete, are brought to us by the patient camera-man. And, more than this, the camera pictures wonders which no human eye can see, photographs of plants and insects enlarged under a microscope. The activities of a bee colony have been recorded by the great Frenchman, Henri Fabre, in his *Life of the Bee;* J. C. B. Mason, an English photographer, whose specialty is the filming of insect life, has produced four films depicting almost as marvelously the activities of the honeybee.

A film company in London is making an attempt to secure from the most prominent European scientific photographers their entire output of educational, scientific and natural history subjects; it is endeavoring to persuade the eminent teachers of certain subjects to commit their work to celluloid film, and it is encouraging also the independent photographer by making the production of scientific films profitable to him. The Pathé Company in the United States has been collecting films of this kind for years and probably has the most remarkable library in the world. Practically every film which has a genuine scientific and educational value is included in this library, but the collection is not yet available for general use.

A film used by the Sheffield Scientific School at New Haven, Conn., called *The Story of Pig Iron,* is a good example of another sort of educational film. The story of sulphur or of common table salt, or of a hundred other mineral products, might be done in the same way. Indeed, there is scarcely a great industry that does not lend itself to this method of presentation. Lessons in public health and hygiene may also be given in this way. The "swat-the-fly" movement has been powerfully assisted by the exhibition of films showing flies at work in spreading disease. A vast amount of good has been done toward improving health and hygiene through moving pictures. Films have been made ranging all the way from a picture illustrating how to clean the teeth properly to a picture showing how to combat the spread of terrible infectious diseases. Clean milk and clean streets have been secured to many a community through the inspiration of moving pictures.

Scientific Investigations. But it is in connection with scientific investigation that the most wonderful films have been made, notably in France and in Germany. The Marey Institute in Paris, founded by Dr. E. J. Marey, an eminent French scientist and a pioneer in moving-picture work, has accomplished seeming miracles. The men engaged in the work use cameras which will take more than two thousand pictures a minute, and other cameras which take one picture an hour. With the very rapid cameras they have studied such movements as the flight of an insect, the beat of a bird's wing; with the slower cameras they have secured such a picture as the budding and blossoming of a flower. To take such a picture the camera is kept before the object sometimes for weeks.

The fastest camera in the world is the invention of Dr. Cranz of the Berlin Military Academy. This camera and the intricate apparatus which operates it have been devoted entirely to the study of the flight of projectiles. The pictures produced are of standard size but the images shown are in silhouette. Five hundred consecutive pictures can be taken in one-tenth of a second; the period of exposure is between one-millionth and one ten-millionth of a second. When the pictures secured are projected on the screen at the rate of about sixteen pictures a second (the standard rate of projection), the flight of a bullet can easily be fol-

THE SEA BOTTOM IN MOVING PICTURES

The method employed in securing pictures of life near the coasts, where the water is about fifty feet deep. The operator sits in the space at the bottom of the collapsible tube which extends downward from the flat-bottomed vessel. An enlarged view of his workroom is shown in the corner picture.

lowed. One film shows the effect of a bullet striking a suspended rubber ball filled with water; another shows the effect of a high-velocity bullet striking a bone and shattering it.

Moving Pictures in Medicine and Surgery. During the last few years the use of moving pictures by physicians and surgeons has been greatly extended. By combining the microscope, the ultra-microscope and the "rapid-fire" camera, the most minute microbes have been studied. By combining the X-ray machine with the moving-picture camera equally striking results have been obtained. The processes of digestion in a frog, in a fowl, in a lizard and in a trout have been photographed; also the processes of the human body, showing the bending of the knee, the opening of the hand, and the like. In addition, great surgeons have been photographed performing some very delicate and difficult operations, such as bone grafting, and this film is available for other surgeons to study.

Industry and Moving Pictures. Frank B. Gilbreth, of New York, an authority on workshop organization, is perfecting scientific management through motion pictures. By means of an elaborate mechanism, Mr. Gilbreth is able to photograph all the motions made by a workman in doing a particular piece of work. These pictures are not made to be projected on a large screen, but are studied under a microscope with a view to discovering waste motions and later reducing all the workman's movements to a minimum. Some of these pictures were made by attaching an electric light bulb to the operator's head and hands and studying the photographed paths of light. Other pictures have been developed for the benefit of apprentices. An apprentice is shown, step by step, the movements made by the most skilled workman in the shop; experience has demonstrated that a youth can learn his craft more quickly by following it on the screen than by observing the actual work. This is due to the fact that many of the movements of a skilled workman cannot be followed with the naked eye. Once these movements have been photographed, however, the camera projects them at a rate slow enough to be studied.

Moving Picture Targets. Another interesting use that has been made of moving pictures has been in improving marksmanship. The motion picture had scarcely been perfected when the war departments of the various countries were flooded with suggestions for making this use of them, but the animated target has not yet been extensively used by military authorities. The idea is as follows: Instead of using the

ordinary target for practice work the soldier fires at a moving-picture target, representing, for instance, a man behind cover, aiming directly out of the picture at the real marksman. Finally, in making his shot, the man in the picture exposes himself, and that is the instant when the marksman must shoot. The picture is so managed that it stops automatically when the bullet hits it so that the marksman may have a chance to see whether or not he has made an accurate shot. Pictures for this work are usually projected at a little less than ordinary speed, as a rate of sixteen pictures a second has proved too rapid even for the exceptional marksman. Pictures of hydroplanes, aeroplanes, birds in flight and wild animals, all furnish suitable subjects for these moving targets.

The Moving Picture Industry

Moving picture production has gone ahead in two fields. There have been the scientists, Europeans for the most part, who have disregarded the commercial possibilities of the new invention and have bent all their energies to research and investigation, and there have been the men, Americans for the most part, who have used it to build up a vast amusement industry. This industry sprang up almost over night; in 1923 in amount of capital invested it was fourth in size in America. It was in 1897 that Cecil M. Hepworth wrote: "That the kinematograph has contributed much to the gayety of nations can hardly be denied, but that it will continue to do so to anything like the same extent for much longer is highly improbable." Hepworth did not know, of course, nor did anyone else, that the time would come when more than 15,000,000 people would visit moving picture theaters every week; that the total investment in the United States would be estimated at more than $1,000,000,000, that the industry would become fourth in size, and this amusement enterprise would give employment to more than half a million people—and yet these are considered conservative estimates to-day.

America leads the world in the production of photoplays. Some wonderful films have been imported from Europe, stupendous productions like *Cabiria* (which was made in Italy), but the importation of films has never equaled the exportation, which amounts to approximately $5,000,000 worth every year. In the beginning the plays produced were, for the most part, very crude—the results of the experiments made by a few expert photographers who had perfected cameras and projecting machines and were determined to use them. But the photoplays of recent years at least equal in dramatic excellence anything produced on the legitimate stage. *Quo Vadis, Les Miserables, Cabiria, Last Days of Pompeii, Don Quixote, The Prince and the Pauper, Birth of a Nation, The Battle Cry of Peace, Civilization; Camille* and *Queen Elizabeth,* with Sarah Bernhardt; *Carmen,* with Geraldine Farrar; *Tess of the D'Urbervilles,* with Mrs. Fiske; and *Madame Butterfly,* with Mary Pickford, are among the most notable of motion picture productions. Many of these films require hundreds of scenes and hundreds of actors; they represent months of labor and an expenditure of money which is almost unbelievable; and they also represent the genius of the greatest actors and producers the world has ever known. But, in spite of the success with which these productions have met, the bulk of photoplays are still quite mediocre—farce and melodrama.

Where the Pictures Are Produced. Production, at first, was decidedly haphazard. The studios where the pictures were taken were for the most part old buildings where rents were cheap, the stage properties were makeshifts, the whole equipment utterly inadequate. Artificial lighting had not been attempted. The first Edison studio was a little house on wheels that was made to revolve on its base so that any face could be turned towards the sun. Nowadays, while it is useless to take pictures out-of-doors unless the day is bright, lights have been invented which make it a simple matter to take pictures in the studios at any time. Mercury vapor lamps and, recently, gas-filled tungsten lights will make any stage lighter than day. Portable mercury vapor lamps have made it possible to take pictures in factories and stores and restaurants. Scenes have even been taken in coal mines, hundreds of feet beneath the surface of the earth, and the great tunnels under the Hudson River, New York, have been filmed.

Picture-Producing Plants. Florida and Arizona, New York and Pennsylvania, New Jersey and Illinois, all have important picture-producing plants, but the great moving-picture center is California. This is due to the fact that the climate of California, with its almost continuous sunshine, makes it possible to take

pictures practically every day in the year. Around Los Angeles the studios cluster by the dozen. But it is absurd to refer to these plants as *studios,* for they are actually manufacturing plants, a little more picturesque than the ordinary factory. Universal City is the largest of the big plants, and as it is also a model plant, embodying all the newest features of picture production, it deserves a detailed description.

Universal City. Universal City, so-called, is the largest picture-producing plant in the world. It is an actual city, with a population of several thosand people, with broad, paved streets, with a main boulevard six miles long, with its own gas and electric light plants, with a mayor and police and fire departments, with two hospitals and a restaurant, with offices and studios. There is even a race track with a huge grand stand that will accommodate thousands of people. When a great scene is being filmed, such as the bullfight in *Carmen,* these seats are sold to the thousands of interested people who come out from the near-by cities, and the director is spared the necessity of hiring a crowd of "extras," as they are called, to fill the seats.

Everything in Universal City has a double usefulness. A building may house the scenario department within, while without it is designed to furnish a background for pictures. The buildings are all built with a different façade on each side, so they may figure in not one, but four, different scenes. As for equipment, there are horses by the dozen, Arabian mares and Shetland ponies, mustangs and mules and burros; there are forty different kinds of horse-drawn vehicles and as many motor cars; there is a tribe of Indians, one of the largest in the United States; and there is a great "zoo," one of the greatest in the world. In addition there are shops where practically everything needed in the production is made; carpenter shops, machine shops and dressmaking shops—factories for turning out everything demanded by the exacting director.

The Scenario Department. The scenario editors for some of the large companies actually write all the plays produced by those companies and receive large salaries for the work. But it is more usual for the scenario editor simply to put into shape all the ideas which are supplied from a dozen sources. If a great novel is to be produced the scenario editor turns it into a play. Stories are bought from magazines and shaped into plays. Ideas submitted by amateurs are often bought and made into plays. And the scenario department also puts into acting form any ideas furnished by producers and directors. When a scenario is complete it is turned over to the director who is to produce this particular play.

The Director. Only one copy of the scenario, which is really the text of the play, is needed, and that is in the hands of the director. When he receives a scenario he sets about ordering the properties, stage settings and costumes which will be needed. To each of the principal actors, if it is a modern play, he furnishes a "dress plot," a list of the number of scenes for which they will need changes of costumes. If it is a "period" play, that is, a play representing a bygone day, the director furnishes all the costumes. When all the preparations have been made, the play begins.

Acting a Moving Picture Play. The director posts on a bulletin board a list of the actors who will be needed for a particular scene, and the actors, who are generally expected to arrive at nine o'clock in the morning, go at once to this board to get their orders for the day. When all are assembled the director rehearses them in the scenes until they are perfect; then the camera-man begins his work and the picture is taken. None of the actors, as a rule, knows what the play is about, for the scenes are seldom taken in consecutive order; it would be too wasteful a method. Once the stage is set, all the scenes which take place in the setting are acted and photographed, one after another, regardless of the order in which they occur in the finished production.

Practically all of the "stars" of the legitimate stage have now appeared in moving pictures. Sarah Bernhardt was the first to do so. She explained that she, for one, would not dream of disregarding this means of immortalizing her art. And, in addition to the stars of the legitimate stage, there has been developed a school of actors—men and women trained in the technique of pantomimic acting, who are, perhaps, even greater favorites with the public.

The Development of Moving Picture Art

What was the origin of this vast amusement enterprise? It was nothing more nor less than a child's toy, based on an optical illusion. When the eye sees a moving object, the image of the object is retained for about one-sixteenth of a second, even though the object itself may

have been visible only one-tenth of that time. This fact is known as *persistence of vision,* and it is the principle on which moving pictures are based. Although pictures are said to be in motion on the screen, as a matter of fact there is no motion at all. The eye imagines it sees movement. But what it actually sees is a series of pictures which are stationary on the screen for an instant and whose movement out of sight is concealed from the eye by a swiftly-moving shutter which cuts off all light from the screen for a brief instant. The eye, being more susceptible to light than to darkness, records only the pictures and not the interval when the screen is black, and an effect of motion is thus produced.

The fact of persistence of vision was first noted by Lucretius, a Roman writer, in the year 65 B.C. Ptolemy, a Greek philosopher, noted the same principle about two hundred years later, and proved it by means of a revolving card on which a series of dots took the appearance of a continuous line. Every child who has whirled a burning stick to produce a ring of fire has had proof of the same principle.

No use was made of this principle until 1825, when a child's toy was invented which consisted of an oblong card with pictures on both sides, which was turned by means of a string so that the two pictures gave the appearance of one. More elaborate toys were later invented, one known as the *phenakistoscope,* another as a *zoetrope,* which utilized the same principle. In 1884 a contrivance called a *choreutoscope* was invented for use in a stereopticon lantern. It was a plate painted with figures which moved in a sliding frame so that a series of images which appeared to be in motion were cast on the screen. This was, in fact, an actual moving picture.

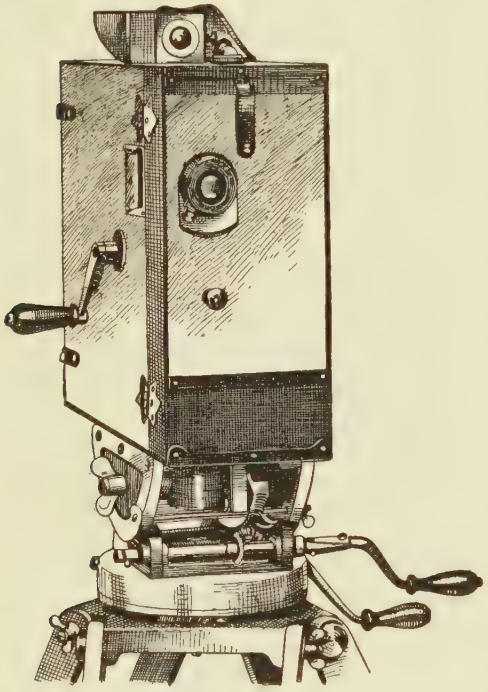
The Earliest Photographic Moving Pictures. In 1872 Eadweard Muybridge, an Englishman, secured a number of photographs of the consecutive movements of a trotting horse by setting up a series of cameras along a race track, which were operated by a string broken by the passage of the horse along the track. These pictures were made in California and were first exhibited in America in 1879. In 1882 they were shown at the Royal Institution in London. Muybridge's method of obtaining these pictures was very clumsy and was quickly supplanted by other inventions. E. J. Marey, in Paris, had begun experimenting with the photographs of animals in motion, and in 1876 he perfected a camera which was known as the Marey photographic gun, which took a dozen pictures of an object in rapid succession. By 1889 celluloid film had been invented. W. Friese Greene and M. Evans in the same year filed for patent several specifications for a camera which utilized this film and which was capable of taking three hundred exposures at the rate of about ten a second. As soon as the Friese Greene camera had appeared, inventors in France, Germany, England and America were simultaneously working at the problem of perfecting similar cameras and projecting machines.

In America Edison was first with his *kinetoscope,* which was patented in 1893. In the same year he gave his first exhibit at the Brooklyn Institute. The pictures projected by this kinetoscope were viewed by one person at a time, looking through an eye aperture. In France, G. Demeney perfected a machine which he called the *chrono-photographe,* which he patented both in France and in England, in 1893. The *biograph* was the name given to a machine invented by Herman Casler of Canastota, N. Y., a projector which used larger pictures than the size standardized by Edison. From this time on the work of perfecting the mechanical devices for taking pictures and projecting them was carried on with the spectacular results that have already been noted.

The Camera. The typical moving picture camera is rectangular in shape. An average size is twenty-four by fourteen by five inches. There are larger cameras than this, of course, and others which are much smaller. The Williamson camera, for instance, is nine and one-half inches square by four and three-fourths inches deep, and weighs only seven and one-half pounds, including the reel of film. The camera case is usually made of polished wood, very strongly put together, with a handle for carrying. Although there are dozens of different makes of cameras on the market, ranging all the way from $60 to $1,000 in price, they all operate on the same principle.

The essential feature of a camera is that it shall take a series of snapshots in rapid succession, with an exposure brief enough to record no movement blur, on a continuous length of film. This film must be made to move before the lens of the camera in a regular series of jerks; at the exact instant when the shutter of the camera opens and closes, this film must be absolutely at rest and then it must move abruptly onward to bring into position the next space which is to be exposed.

If viewed from the side, the interior of the camera is seen to be divided into two sections by a long, narrow tube which runs through the middle and contains at one end the lens, at the other end an aperture with a screw cover which serves as the "finder" for the machine. Often there is an additional finder on top of the camera. The back half, upper and lower, is occupied by two zinc boxes containing the spools of film, the upper for unexposed, the



THE CAMERA

The most modern device of the kind, with patents granted in 1917.

lower for the exposed, film. The unexposed film is wound on a spool, and the end runs off this spool and under a guide roller, then under a wheel which is furnished with sprockets which catch the perforations in the edges of the film, to keep it from slipping. Usually there is a spring roller as well, which presses the film firmly against the sprocket wheel and makes slipping impossible. The film then passes through a gate which is just behind the lens. The gate holds the film perfectly flat and steady during an exposure. Below the gate is the mechanism which, by means of claws engaging the perforations in the film, jerks it down space by space, as fast as it is supplied by the sprocket wheel. Below this mechanism the film passes under another sprocket wheel, then under another guide roller, and finally winds upon a second spool.

The Shutter. The shutter of a motion picture camera is circular, with a triangular opening in it. Because the shutter is geared to the same crank shaft as that which feeds the film, its proportionate rate of speed cannot be increased. It makes one revolution every time a space of film is exposed. But, since the length of time for an exposure varies with the amount of sunlight, it is essential that the shutter be adjustable. To secure this, it is made in two pieces. If a very brief exposure is needed, the aperture in the shutter is made smaller; if a long exposure is needed, it is made larger. The mechanism which jerks the film into place is also geared to the same crank shaft. This makes the camera very easy to operate. The photographer simply turns the crank handle on the outside of the camera, making usually two turns of the crank in taking sixteen pictures, and the film begins to move, the claws jerk it into place, and the shutter revolves.

Other Fittings. Most cameras are fitted with a measurer, which registers on a dial on the outside of the camera the number of feet of film exposed. There is a device for punching a hole in the film to mark the end of an exposure —to show where one subject finishes and another begins; and there is a speed indicator which shows exactly how fast the handle is being turned.

The Tripod. The tripod used is geared so that it may be adjusted to any level by the turn of a crank; the table of the tripod also revolves so that the camera may be turned in any direction, and it also tilts at will. The tripod is very strongly built, for absolute rigidity is necessary in taking good pictures.

The Film. All motion picture cameras and all projecting machines use one size of film and take pictures of one size only. All film is one and three-eighths inches wide, including the perforations, and the length of film exposed for each picture is three-quarters of an inch. One foot of film, therefore, contains exactly sixteen pictures. The film may be bought in any length, from 100 to 5,000 feet, but the average camera will contain only 2,000 feet of film at one time. Practically all the film on the market is supplied by a Rochester, N. Y., firm.

Developing the Film. All cameras containing exposed film are taken to the developing plant of a studio and unloaded in a dark room. Here the film is unwound upon a revolving upright frame, and it stays on this frame while it is de-

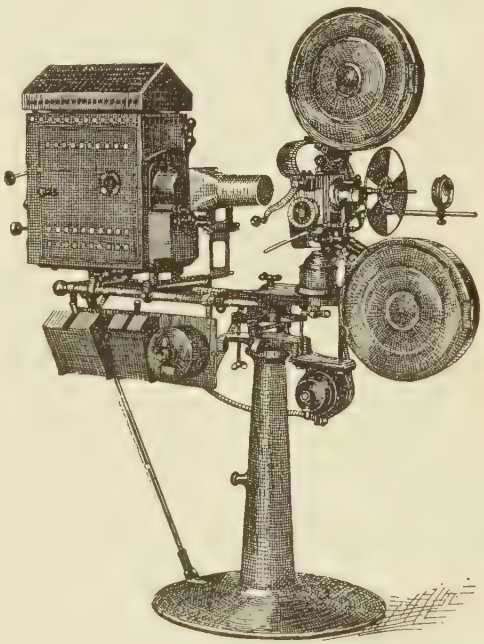
veloped, rinsed, "fixed," and rinsed again. For drying it is wound on a great cylindrical frame and fanned. This drying process is a very delicate one. The drying cannot be done with warm air because heat melts the emulsion with which the film is coated. The room in which the drying is done has to be absolutely dust-proof because the tiniest particles of dust would spot, and thus spoil, the film.

The developed film is known as the *negative*. The films which go out to the picture theaters are known as *positives*. Positive films are not made until the negative has been inspected and the entire picture "assembled." For, as it has been noted above, scenes are not taken in their consecutive order, and a negative is, therefore, usually an unassorted group of dozens of scenes. But each of these scenes is numbered, at the time the picture is taken, in a very simple way. Someone in the picture simply holds up a card on which the number of the scene is printed and this appears in the photograph. The camera-man, too, has marked the end of all scenes by punching a hole in the film.

The negative, when developed, is cut in two wherever these holes have been punched. The sections of film are dropped into cylindrical containers and sent to another workroom. Here operators sort the lengths of film according to number, and glue them together. This negative is then inspected by the director, who cuts out any imperfect portions and indicates where the printed explanatory matter is to be inserted. These captions are printed in silver on black cards, photographed separately, and inserted in the finished negative. It is from this negative that the positive prints are taken. The positive prints are made by means of very elaborate and efficient machines operated by electricity. Because of the enormous number of positive prints which have to be made, the printing room is one of the largest in the developing plant.

Distributing the Finished Film. Practically all the film produced is handled by the film "exchanges" located in all the large cities. It comes to them from the producing plants, each film in a round zinc box, securely protected from dust and fire. The exchanges do not sell a film to a theater, but simply rent it, and eventually it all returns to the producing plant, where, if it is worth saving, it is stored in a great fireproof vault. A large film exchange, which keeps thousands of films moving all the time, is an exceedingly busy place. Usually a film is out of the exchange for only three or four days. As soon as it comes in again it is inspected for broken places and for spots and dirt. Torn places are cut out and the film glued together again, and, if it is very dirty, it is washed in the film laundry which all large exchanges maintain. If it is badly spotted it is retouched by hand and then is ready to go out again. In the hands of careful operators one film can usually be run five hundred times, but the life of many films is much shorter than this.

The Projecting Machine. A moving picture projector is nothing more nor less than a stereopticon lantern in combination with a mechanism for moving the film in front of the lens of that lantern. The film must move at such a rate of speed that sixteen pictures are projected in one second. But this motion cannot be smoothly continuous. The motion of the film must be intermittent; it must move ahead and then come to rest at the exact instant when the revolving shutter exposes it to the beam of light from the lantern; and then, when the shutter cuts off the light, it must move ahead again. The mechanism for moving the film is almost exactly like that in the camera. The



THE PROJECTING MACHINE

An instrument like the one shown above flashes upon the screen the pictures you may enjoy every evening, provided your favorite theater has the latest machine, with 1917 patents.

lantern used is a carbon arc light which gives a very intense flame. This flame is further intensified by being focused to a pin point by means of two lenses, so that a very clear, sharp image will be cast on the screen. If, for any reason, the film stops moving this light would set it afire. To avoid this danger all projecting machines now have a metal gate between the light and the film which closes automatically whenever the film stops, cutting off the light. In addition, the operator and machine are placed in a metal fireproof booth, so the audience will not be imperiled in case of fire.

Fireproof film was being generally adopted to avoid all danger from fire, but it was a European invention and the War of the Nations cut off the entire supply. Experimenting is now being done in a number of laboratories in an attempt to discover the formula for this film, but up to 1917 no one had succeeded. All projecting machines in theaters are operated by electricity. There are a number of smaller, hand-power machines on the market, but their use is greatly restricted because it is impossible to generate a powerful light in such a machine. Some use of these hand-power machines has been made in schools, but the pictures thrown on the screen are not clear.

The Censorship. Moving pictures differ from any other form of amusement in that they are presented to audiences composed of people of all classes and all ages. Because children began attending these theaters in such large numbers, the question immediately arose as to whether or not the sort of pictures presented were an influence for good. The People's Institute of New York reached the decision that much was being presented in pictures which was directly harmful to the public. It was with the children in mind that the National Board of Censorship was founded in 1909. This is a voluntary and unofficial group composed of intelligent, highly-educated men and women of unimpeachable moral character, none of whom is engaged in or has any connection with the moving picture business. This board views about ninety-five per cent of all the films produced in the United States and suggests any changes that they deem advisable. The work of the board is supplemented by local boards in most of the large cities. Every film which is exhibited in any large city, even though it has been passed on by the National Board, is viewed again by a local board or a state board, before it can be exhibited. There has been much dissatisfaction with moving-picture censorship.

Some of the best books on the subject of moving pictures are *The Cinematograph Book,* a *Complete Practical Guide to the Taking and Projecting of Cinematograph Pictures,* edited by Bernard E. Jones; *Practical Cinematography and its Applications,* by Frederick A. Talbot; *The Handbook of Kinematography,* by Colin N. Bennet; *The Theater of Science,* by Robert Grau; *Making the Movies,* by Ernest A. Dench; and *The Art of Moving Pictures,* one of the best books for general reading, by Vachel Lindsay. Perhaps the most interesting material, however, will be found in the files of the popular magazines, especially the moving-picture publications.

MOWAT, *mo'at,* Sir Oliver (1820-1903), a Canadian statesman and jurist, who enjoyed the distinction of acting as premier of Ontario for twenty-four consecutive years, a longer period than any other premier, in the history of Canada or the British Empire, has ever held office. Mowat became premier in 1872, and retained the office until 1896. His administration was chiefly noteworthy for frequent disagreements between the provincial and Dominion governments, in practically all of which the Ontario government was sustained when the questions were carried to the courts.

Sir Oliver was born at Kingston, Ont., where he received his education and studied law in the office of Sir John A. Macdonald. In 1841 he was called to the bar, and for a number of years practiced his profession at Kingston. Elected to the Canadian assembly in 1857, he immediately took a prominent place because of his high standing at the bar. In 1858 he joined the Brown-Dorion Cabinet as provincial secretary, and in 1863-1864 was Postmaster-General in the Macdonald-Dorion Cabinet. The movement for Confederation had in him one of its strongest supporters, but in 1864, when it was just getting under way, he retired temporarily from political life. For eight years, 1864-1872, he was a judge of the court of chancery for Ontario.

This service on the bench did not prevent his reëntrance into politics in 1872, when he succeeded Edward Blake as leader of the Liberal party and premier of Ontario. During his premiership many important questions affecting the relation of the province to the Dominion were settled, and many times almost entirely through his own ability and initiative. When the Liberals were returned to power in 1896, Mowat was summoned to the Dominion Senate and was given the place of Minister of Justice in the Laurier Ministry. He resigned in the next year, and from then until his death was lieutenant-governor of Ontario.

MOWING, *mo'ing,* **MACHINE,** a machine for cutting grass. Its essential part is a frame carrying a long steel blade with sharp, triangular teeth along one edge, which moves rapidly back and forth in a metal guard. The grass is swept against the guard as the machine moves forward, and the keen knives sever the stalks close to the ground. The horizontal guard, or arm, is usually about four feet long, and it cuts a swath equal to its length. A good machine will cut from seven to ten acres of grass in a day. Two horses can pull it and furnish all the power that is needed to operate the knives. The wheels on which it rests are so attached to the blade that their circular motion is transformed into a rapid back-and-forth, or reciprocating, motion. The mowing machine is a simpler kind of reaping machine. Up to 1917 no mowing machines had been manufactured to be run by tractor, or gasoline, power. See REAPING MACHINE.

MOZAMBIQUE, *mo zam beek',* **CHANNEL,** the passage between the east coast of Africa and the island of Madagascar, bordering the province of Mozambique in Portuguese East Africa. The channel is over 1,000 miles in length and varies in width from 250 miles at the center to 600 miles at either end. A warm current passes through it, which, striking Agulhas Bank to the south, produces one of the roughest seas in the world. In the northern part of the channel, midway between Africa and Madagascar, are the Comoro Islands. On the west shore are the ports of Beira and Mozambique. Several submarine cables are laid in the channel from Mozambique and Beira to other East African ports and Madagascar. For illustration, see colored map AFRICA, or MADAGASCAR.

MOZART, *mo'zahrt* (in German, *mo'tsahrt*), JOHANN CHRYSOSTOMUS WOLFGANG AMADEUS (1756-1791), a German musician, born at Salzburg. At the age of two he showed such interest in the music lessons which his father was giving the daughter Nannerl that the ambitious parent began to teach him also, and at the age of three he was receiving a daily lesson an hour long. At five years of age he was composing short pieces for the harpsichord, and at six played before the Elector of Munich and the Empress Maria Theresa of Austria, at Vienna.

When the boy was seven years old he played before royalty at Versailles and Paris, and at the former city had the pleasure of seeing four of his compositions published. Then he and his father went to England and played before Queen Charlotte. There Johann composed his first symphony and astounded the Royal Society by his knowledge of music. "The professors of Europe stood aghast at one who improvised fugues on a given theme and then took a ride-a-cock horse on his father's stick." By this time the imperious Archbishop of Salzburg, by whom the father was employed as choirmaster, demanded their return, and, hoping to prove the lad a fraud, locked him in a room for a week to write an oratorio by himself. Johann did it, and the oratorio was sung in the archbishop's church a few weeks later.

MOZART

In 1769 the boy went to Italy to learn something of the music of that country, and while there played before astonished audiences in Milan, Bologna, Verona, Naples and Rome, and received from the Pope the title of Cavaliere and the badge of the Order of the Golden Spur, honors bestowed upon only the very greatest. There in Rome, also, he performed the wonderful feat of writing from memory the long papal *Miserere,* copies of which were never allowed to be taken by the singers from the Pope's chapel. Then at Milan the fourteen-year-old boy wrote an opera, *Mitridate,* which was sung twenty nights in succession. In 1775 he wrote an opera for the Munich carnival, and every song in it was greeted with "a tremendous uproar and clapping of hands."

At twenty-two he went to Mannheim, Germany, and began to teach and compose for his living, and there it was that the tragedy of his life began. He boarded with a family named Weber, and fell madly in love with Aloysia Weber, who was training to be an opera singer. He was soon called to Paris, where, with his mother as a companion, he worked earnestly. Suddenly the mother died, and Mozart journeyed back to the Webers for consolation, only to find that Aloysia's head had been turned by a little success in singing and that she would have nothing to do with him. He returned in sorrow to his home in Salzburg, where he

wrote a number of masses and two operas, *King Thomos* and *Zaïde*.

At twenty-six years of age he was in Vienna, where he again met the Webers, fell in love with Constanza Weber, and over the protest of his father married her in August, 1782. Then followed nine years of desperate work, teaching, giving concerts and composing with a rapidity almost incredible, while a sickly, self-centered and selfish wife daily plunged him more deeply into debt. Constanza probably loved him, but she was weak-willed, and measured his success simply by the money he made. Amidst such trials he wrote his greatest operas, *Figaro, Don Giovanni* and *The Magic Flute,* masterpieces that will probably never lose their popularity. In the summer of 1788 he composed his famous symphonies in C major, G minor and E flat, frequently called "the most impassioned works in instrumental music," and with these came a host of shorter compositions. His efforts to pay his debts by frequent concert tours exhausted his strength, and in his thirty-fifth year the idea of death began to haunt him.

One day in the last year of his life a tall, gray stranger appeared before him and offered him a cash sum for a requiem, or death composition. The music was desired by an Austrian nobleman, but the stranger would give no further information. Mozart, in need of money, undertook the work, but as his weakness increased, he became possessed of the idea that this beautiful composition, *The Requiem,* was really for his own funeral, and day and night he stole time to work upon it. Upon his return from one of his concert tours in the fall of 1791, his wife was shocked at his pallor and weakness, and for once forgot about her own petty ailments. But help was too late; his weakness increased until Sunday, December 5, 1791, when, trying to explain exactly how *The Requiem* should be played, he sank back upon his pillow in death.

He was so poor that his funeral had to be exceedingly plain, and as the day was stormy no friends went to the grave in the common burial ground for the poor. A servant suggested placing a wooden cross on the spot, but his wife said that doubtless the parish officers would attend to it. So long a period passed before she revisited the grave that the sexton had removed the bones for those of another pauper. To-day a beautiful monument for him stands over the empty grave in Vienna, while no one knows where Mozart's dust lies. R.D.M.

Consult Gehring's *Mozart;* Holmes' *Life of Mozart.*

MUCILAGE, *mu'si layj,* a solution of the gum of a small tree growing in Arabia and other parts of Asia, from which gum arabic (which see) is obtained. This gum exudes from the bark of the tree after an incision is made, and soon hardens on exposure to sunlight and air. Gum of the best quality is semitransparent and readily dissolves in hot water, forming a mucilage whose thickness depends upon the quantity dissolved. The name is also applied to paste solutions such as are used on envelopes and labels and for a variety of other purposes, a few drops of carbolic acid being generally added to keep them from molding. Mucilage has its place in medicine, being valuable in all irritations of the mucous surfaces (see Mucus, below).

MUCUS, *mu'kus,* a clear, sticky fluid which forms a layer of varying thickness on the surface of those membranes which line the cavities communicating with the outside of the body, such as the nose and mouth cavities and the intestinal canal (see Membranes, subhead *Mucous Membranes*). Mucus is produced by certain cells in the mucous membranes, and its chief purpose is to keep those membranes moist and slippery and to protect them from irritating substances. The gullet well illustrates its lubricating action; the secretion of mucus in that tube enables the masticated food to slip down easily into the stomach. Minute particles of dust or lint breathed into the nose are washed down into the throat by the mucus and so are kept from passing to the lungs. When too much dust, or particles of it containing disease germs, are breathed into the nose the mucus becomes thick and yellowish and is secreted in larger quantities. This is due to infection of the membrane, and the condition is known as a "cold." See Cold. W.A.E.

MUD HEN. See Coot.

MUD PUPPY, WATER DOG, or **MUD EEL,** a long, slender salamander that lives in ponds and streams of America. It differs from nearly all the other salamanders in having gills which develop in the larval stage and are retained throughout the adult period. It grows to be about a foot long, in color a slimy, dirty brown, resembling a tadpole just before it loses its tail; it has a body like an eel's, with two short legs up under the head. There are four toes on each foot. In the daytime the mud puppy stays among the weeds and rocks in the mud, but at night it moves quickly

about hunting for the crayfish, bugs and worms on which it feeds. See SALAMANDER; AMPHIBIANS.

MUD TURTLE, the name given to a dull-shelled turtle, usually less than five inches in length, which is found living in mud or muddy water, in all parts of the United States and Canada. See TURTLE.

MUEZZIN, *mu ez'in.* See subhead, in article MINARET.

MUIR, JOHN (1838-1914), an American naturalist who loved and studied nature, living most of his life out-of-doors. He loved to tramp and study all day long, and sleep, when night fell, on beds of moss and leaves or boughs. His equipment on these journeys consisted of a little bag of bread and tea and a few simple tools. He never killed game, for he looked upon wild animals as his friends.

John Muir was born in Dunbar, Scotland, and emigrated to America when a lad of eleven. His parents moved to a farm in Wisconsin, and as a boy he had to work very hard; but by rising frequently at one o'clock in the morning, he found time to read and study. Moreover, he invented a wooden clock that told not only the time of day but the day of the week and the month of the year. Out of the iron end-rod of an old wagon he made a thermometer, the expanding and contracting iron moving a finger to the degrees on a dial. Two inventions must have been suggested by the character of his daily life—an automatic device for feeding horses, and what he called a bathing machine. He also invented a barometer, a pyrometer and a hydrometer.

Some friends who were interested persuaded him to take some of these inventions to a fair in Madison, and the final result of this was that he entered the university there. After four years of study he began his long and interesting travels. He tramped through the country about the Great Lakes, then through Florida and Cuba, going afterwards to California. There in the land he called "the grand side of the mountains" he cultivated a large ranch and made his home with his family. He explored the Sierra Mountains and told the world about them in magazine articles. He traveled in Alaska and there discovered the great river of ice since known as the Muir Glacier. He also traveled in Norway, Sweden and Switzerland, and once made a trip around the world, visiting Russia, Siberia, Manchuria, India, Australia and New Zealand. One of his most intimate friends was that kindred spirit, John Burroughs (which see), America's great literary naturalist.

It is partly through the influence of John Muir that the United States government has carried on the great work of creating National Parks (see CONSERVATION). During the last year of his life he wrote of his travels and the nature secrets which he knew. Some of his most important books are *Our National Parks, The Mountains of California, My First Summer in the Sierra* and *The Yosemite.*

MUIR GLACIER, *gla'sher,* a celebrated glacier of Alaska, discovered by John Muir, for whom it was named. It is at the head of Glacier Bay, rises over 200 feet above the water, extends inland fifteen miles and covers an area

MUIR GLACIER

of 350 square miles. The extent below the surface of the sea is estimated at 700 feet. Muir Glacier is one of the great attractions to tourists visiting Alaska, since steamers can approach within a short distance of the shore. Its front is an overhanging cliff which resembles bluish-white rock, worn and rugged; from this front icebergs are constantly breaking with a loud crash and falling into the sea. See GLACIER.

MUKDEN, or **MOUKDEN,** *mook'den,* the capital of Manchuria, China, and of Shengking, one of its three provinces, about which was fought, in February-March, 1905, one of the greatest conflicts of modern history (see RUSSO-JAPANESE WAR). Mukden is situated in a fertile region about 400 miles northeast of Peking and 110 miles northeast of New-chang, its Liao River port, and is not far from the stream Hun-ho. The old Chinese name was Sin-yang, but the Manchus renamed it Mukden, which means *flourishing capital.* It is surrounded by a wall forty feet high, and is a well-ordered city, laid out on a plan similar to American towns.

Owing to the improved railway facilities and the development of the Soya bean, millet and rice industries, Manchuria has grown in wealth more rapidly than any other part of China. In 1905 China granted Japan the right to extend

its railway from Mukden to Antung, where it connects with the Korean railway. In 1912 a railroad line was opened to traffic from Changchun to Kirin, and from Mukden southwards the railway extends to Dalny and Port Arthur. During the Boxer uprising in 1900 the city suffered greatly (see CHINA, subtitle *History of China*). Population, about 158,000.

MULATTO, *mu lat' o,* a person belonging to one of the mixed races, having white and negro blood in nearly equal proportions. The mulatto has tightly-curled hair and a yellow complexion, but resembles the white race more than the black. The child of a white person and a mulatto, being three-fourths white, is termed a *quadroon.* The term *mulatto* is often confused with the name *creole;* the latter is properly applied to a white person born in the Southern states of the Union, especially Louisiana, of French, Spanish or Portuguese ancestors. In a country where there are many mixed races the term *creole* is one of honor and confers social standing. See CREOLE.

MULBERRY, *mul' ber i,* a group of trees and shrubs belonging to the mulberry family, found in the temperate zones and in mountainous re-

O, the mulberry-tree is of trees the queen!
Bare long after the rest are green;
But as time steals onwards, while none perceives
Slowly she clothes herself with leaves—
Hides her fruit under them, hard to find.
* * * * * * *
But by and by, when the flowers grow few
And the fruits are dwindling and small to view—
Out she comes in her matron grace
With the purple myriads of her race;
Full of plenty from root to crown,
Showering plenty her feet adown.
—MULOCK: *The Mulberry Tree.*

gions of the tropics. Of the several species, the *white mulberry* is of special economic importance, because its leaves form the best-known food for silkworms (see SILK). The white mulberry, which has been cultivated from earliest times in China, is now grown in Southern Europe and in various parts of the United States. The several attempts which have been made to establish the culture of silk in the latter country, however, have not met with encouraging results. The fruit of these trees is a berry, which may be white, red or purple in color. Mulberries as a rule are so sweet they lack in piquancy, and are therefore inferior to the blackberry, which they somewhat resemble.

The common, or *black, mulberry* is a low, much-branched tree which bears rough, heart-shaped leaves and a purplish-black fruit; the latter is used both as a dessert and in preserving and wine making. This tree is cultivated extensively in Europe and to a limited extent in California and the Southern states. The *red mulberry,* a native of Eastern North America, is a large tree which grows from sixty to seventy feet in height, and bears a sweet, dark purplish-red berry which is also good to eat. The wood of this species is valued for building purposes, for it is fine-grained, strong and durable. Another interesting member of the group is the *paper mulberry,* native to India, Japan and islands of the Pacific, and so called because its inner bark is used by the Japanese for making paper. Inhabitants of the Pacific islands also make some of their garments from its bark.

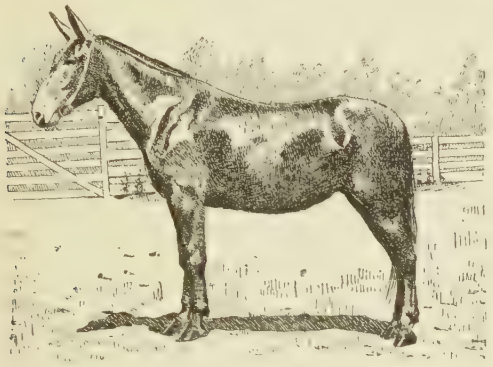
On the whole, the mulberries are not of first importance as fruit trees, but many beautiful songsters are fond of their berries, and they should be planted to attract these welcome summer visitors.

MULE, the name applied to the offspring of the male ass and the mare, highly valued on

A CHARACTERISTIC JACK

account of its unusual powers of endurance. The animal has a large head, long ears, slim tail, short mane and pointed hoofs, and is usu-

ally dull-brown in color. It is long lived, almost immune from disease, is able to live under poor fare, and it endures harsh treatment with fortitude. Being agile and surefooted, it is useful as a pack animal in mountainous countries. It is extensively bred in Texas, Missouri, Mexico, Spain, France and Northwest India. Particularly valuable service has been rendered in the breeding of mules at



FINE TYPE OF HEAVY MULE

the Mississippi Agricultural Experiment Station, but probably the most famous mules in the world are those bred in Missouri. The allied powers of England, Russia and France bought many thousand Missouri mules for service in the War of the Nations after the autumn of 1914.

The total number of mules in America was about 4,500,000 in 1916. The cotton and sugar plantations of the South utilize large numbers. The price of a mule may be as high as $300, although the average is below that sum.

MULE DEER, a deer of North America, so called because of its very large, furry ears. Before civilization spread to the Pacific, it might be seen in any of the open regions of the western part of the continent, but to-day its range is limited. It is about three feet, four inches high at the shoulder, has a yellowish coat and high, branching antlers.

MULLEIN, *mul'in,* or **MULLEN,** *mul'en,* the name of a group of plants containing about 100 species, three of which are seen in the United States—*common, white* and *moth mullein.* The plant grows as a weed throughout the country, and has a stalky, tall stem, ending in a spike of bright yellow flowers. The plant sometimes reaches a height of seven feet, but two to three feet is the usual growth. The leaves are thick and rough, and the whole plant is covered with downy hair. From mullein is made a medicine which is used sometimes in the treatment of coughs, nervous irritations and inflammatory pains. In early times the stalk was used for a wick and dipped into tallow. These candles were known as *hag-dips.*

MULLEIN
At left, common mullein; at right, moth mullein.

MULLENS, Priscilla, a Puritan maiden, one of the *Mayflower* passengers, whose romantic story is linked with that of John Alden (which see). See, also, Mayflower, for list of passengers.

MÜLLER, *mü'ler,* Friedrich Max (1823-1900), a German scholar and writer, probably the greatest authority of his time on the world's languages. He was born at Dessau, in the duchy of Anhalt, and there he received his early education, but in 1836 he went to Leipzig, where he took his degree and began the study of Sanskrit. He settled permanently in England in 1846 and the next year was commissioned by the East India Company to edit the *Rig-Veda,* a classic of Sanskrit literature. In 1854 he became professor of modern languages at Oxford, a position he held until 1875, during which time he published treatises on the science of language. His greatest single work was a translation called *The Sacred Books of the East.* Other published works included *Chips from a German Workshop* and *The Origin and Growth of Religion.*

FRIEDRICH MAX MÜLLER

MULLET, *mul'et,* the name of several species of fish found in temperate and tropical waters. They feed chiefly on vegetable matter, and are famous for the quality of their flesh. The Romans considered the *red mullet* a great delicacy; Pliny states that the sum of $300 was paid for one fish. The *striped mullet,* which weighs from ten to twelve pounds, is the largest and the best of all the species. *Botargo,* a preparation from the roe of the mullet caught in the Mediterranean Sea, is a favorite relish in the south of France and in Italy. The body of the mullet is almost cylindrical. These fish are usually caught in nets.

MULOCK, *mu'lok,* Dinah Maria. See Craik, Dinah Maria Mulock.

MULOCK, Sir William (1843-), a Canadian jurist and statesman, at one time Postmaster-General of the Dominion and after 1905 chief justice of the exchequer court for Ontario. Through his efforts, while he was Postmaster-General, a letter rate of one penny (two cents) an ounce was established in 1898 for the United Kingdom, Canada, Newfoundland, Cape of Good Hope and Natal. This rate was later extended to other parts of the British Dominions. While he was Postmaster-General, he introduced a law providing for the creation of a Dominion Department of Labor, and from 1900 to 1905 he was its first Minister.

Sir William was born at Bondhead, Ont. He was graduated from the University of Toronto, of which he was vice-chancellor from 1881 to 1900. He began the practice of law in 1868, at Toronto, and was created queen's counsel in 1888. In 1882 he was elected to the Dominion House of Commons, of which he remained a member until 1905. On the formation of the Laurier Cabinet in 1896 Sir William joined it as Postmaster-General. He resigned in 1905 to accept the chief justiceship of the Ontario exchequer court. All problems affecting agriculture, banking and commerce have always interested him, and he is known especially as an advocate of conciliation and arbitration, both in industrial and in international disputes. He was created a Knight Commander of the Order of Saint Michael and Saint George in 1902.

MULTIGRAPH, *mul'ti graf,* a device for printing letters and other documents, so that they resemble typewritten copies. The multigraph consists of a hollow steel cylinder mounted on a horizontal axis and with parallel grooves on the surface for holding the type. The cylinder is divided into two sections, one of which revolves. The grooves in the sections are alike. Each groove in the stationary section contains all the type of the same letter, one groove containing the a's, another the b's and so on, the capitals being in one groove and the small letters in another. The set of type, or font, contains all the letters, figures, space slugs and marks of punctuation necessary to set up matter that will fill one page of letter paper, that is, a sheet eight and one-half by eleven inches.

The operator sets the type by bringing the groove in the movable section of the cylinder opposite the groove containing the desired letter and sliding the type into place. A bedplate, or *platen,* under the cylinder is so adjusted that it presses the paper against an inked ribbon that covers the type as the cylinder is rotated. The paper is fed to the machine as the cylinder revolves, and with an electric motor for power 5,000 or more copies can be printed in an hour. Machines operated by hand turn out about 1,500 an hour.

The multigraph works on the same principle as the printing press, and any number of copies can be printed from it.

MULTIPLICATION, *mul ti pli ka'shun,* the process of using a number as many times as is indicated by the number of units in another number. This subject is best approached by studying an example in addition. $6+$6+$6+$6=$24. We add as follows: $6 plus $6 is $12; $12 plus $6 is $18; $18 plus $6 is $24. As long as we add in this way, not regarding the equality of the addends, but just recognizing the sum at each addition, and the final sum, we have *addition.* But as soon as we recognize that we are using 6 four times a new element enters in—the *abstract number*—the *number* of times the number 6 is used. With this new element comes *multiplication.* The sign of multiplication is the oblique cross ×. It is read *times* or *multiplied by.*

If a child takes a step 2 feet in length, when he has taken 8 such steps he has gone 8×2 ft. or 16 ft. (read 8 times 2 ft., or 16 ft.) or 2 ft. ×8 or 16 ft. (read 2 ft. multiplied by 8, or 16 ft.). Other examples follow:

$$3¢+3¢+3¢+3¢=12¢$$
$$4\times 3¢=12¢$$

$$7 \text{ in.}+7 \text{ in.}+7 \text{ in.}=21 \text{ in.}$$
$$3\times 7 \text{ in.}=21 \text{ in.}$$

$$\$8+\$8+\$8+\$8+\$8=\$40$$
$$5\times \$8=\$40$$

Fig. 1 shows *4 rows,* each row containing *7 dimes,* or *7 rows,* each containing *4 dimes.* Each horizontal row contains 7 times 1 dime,

and 4 rows contain $4\times7\times1$ dime or 28 dimes. Each vertical row contains 4×1 dime, and 7 rows contain $7\times4\times1$ dime or 28 dimes.

We see that the *product* (as the answer in multiplication is called) is the same in both

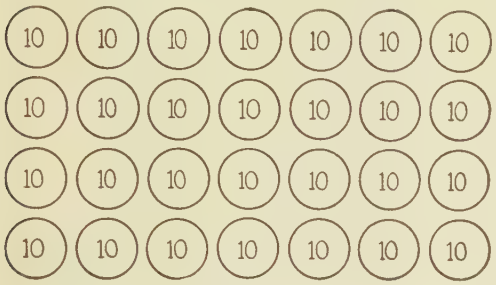


FIG. 1

cases. The number used is called the *multiplicand;* the number which tells how many times the multiplicand is to be used is the *multiplier.* But we have seen above that we may use either number as the multiplicand or multiplier, and the products are the same; for example, $6\times\$5=5\times\$6$, for one equals $6\times5\times\$1$, and the other $5\times6\times\$1$, or each equals $30\times\$1$; $7\times8c=8\times7c$; 9×4 ft.$=4\times9$ ft., and so on.

A man buys 7452 bushels of apples at \$3 per bushel. What did they cost?

The cost is $7452\times\$3$. This is an awkward multiplication. Since we know that this is the equivalent of $3\times7452\times\$1$, we multiply in the simpler way:

$$\begin{array}{r} 7452 \\ \times\ 3 \\ \hline 22356 \end{array}$$

The child learning multiplication should build up many concrete groups that he may see this *interchange of multiplier and multiplicand.* This is called commutation. He should learn many multiplication facts in building and taking apart *concrete* groups; he should use various units of measure to measure distances, finding the whole distance as a product rather than a sum. For example, he finds his table to be 7×3 inches long and 6×3 inches wide; he finds the schoolroom to be 9×3 feet long and 7×3 feet wide. Many of these facts should be learned before he formulates the *multiplication tables.* The "tables" may be built with inch cube blocks, cardboard squares, drawings on squared paper, etc. The tables should be *learned after* the facts are understood, through much concrete work. Many methods of work and play may be evolved to learn them. Cards with multiplication facts written large may be held up in rapid succession by the teacher; individuals may answer, class may answer, sides may be taken and a rival game ensue. Products may appear on cards, and the child may tell what numbers make them, as $45=9\times5$, $64=8\times8$.

A series of products may be placed upon the blackboard:

$45=$
$32=$
$72=$

The class fill out with correct factors, as

$45=9\times5$
$32=8\times4$
$72=9\times8$

Or such a series as this may be placed on the board:

$n\times8=72$
$n\times9=27$
$6\times n=30$

The class go to the board, erase n and put in the correct number.

(1) $2\times13=n$

(a) $13=10+3$

$2\times13=(2\times10)+(2\times3)=26$

(b) $\begin{array}{r} 13 \\ \times\ 2 \\ \hline 20 \\ 6 \\ \hline 26 \end{array}$ (c) $\begin{array}{r} 13 \\ \times\ 2 \\ \hline 6 \\ 20 \\ \hline 26 \end{array}$ (d) $\begin{array}{r} 13 \\ \times\ 2 \\ \hline 26 \end{array}$

In (a) we see 13 as 10 and 3; and to have 2 thirteens, we must have 2 tens and 2 threes. In (b) this is set down in more concise form. In (c) we put 2 threes, or 6, down first, and then 2 tens. In (d) we set 20 down as 2 in *ten's place.*

(2) $4\times122=n$

(a) $122=100+20+2$

$4\times100=400$
$4\times\ 20=\ 80$
$4\times\ \ 2=\ \ 8$
$4\times122=100+80+8=488$

(b) $\begin{array}{r} 122 \\ \times\ 4 \\ \hline 400 \\ 80 \\ 8 \\ \hline 488 \end{array}$ (c) $\begin{array}{r} 122 \\ \times\ 4 \\ \hline 8 \\ 80 \\ 400 \\ \hline 488 \end{array}$ (d) $\begin{array}{r} 122 \\ \times\ 4 \\ \hline 488 \end{array}$

(3) $\begin{array}{r} 326 \\ \times\ 3 \\ \hline 900 \\ 60 \\ 18 \\ \hline 978 \end{array}$ $\begin{array}{r} 326 \\ \times\ 3 \\ \hline 18 \\ 60 \\ 900 \\ \hline 978 \end{array}$ $\begin{array}{r} 326 \\ \times\ 3 \\ \hline 978 \end{array}$

In the last part of (3), he holds or "carries" in mind the 10 of the 18, and adds 1 ten to 6 tens, which he gets by multiplying 3 by 2.

(4) $456=400+50+6$

$$\begin{array}{r} 456 \\ \times 7 \\ \hline 2800 \\ 350 \\ 42 \\ \hline 3192 \end{array} \qquad \begin{array}{r} 456 \\ 7 \\ \hline 42 \\ 350 \\ 2800 \\ \hline 3192 \end{array}$$

Lastly, carry in mind the numbers to be added to tens and hundreds, and work in the most concise form; but do not, in teaching young children, go too rapidly to the carrying or reducing process. Let there be much of the work written out in full in the early lessons, as shown above. The final form is:

$$\begin{array}{r} 456 \\ \times 7 \\ \hline 3192 \end{array}$$

By placing a zero at the right of a digit, the digit is moved one place to the left, and the number it symbolizes is multiplied by 10, as 9, 90; 6, 60. The 9 and the 6 are moved from units place to tens place. So to multiply an integer by 10, 100, etc., annex one, two, or more zeros (see Decimal Fractions).

$756\times10=7560$. Before the zero was annexed, 6 was 6 ones, 5 was 5 tens or 50 ones, 7 was 7 hundreds; now 6 is 6 tens or 60; 5 is 5 hundreds, and 7 is 7 thousands. The number was $700+50+6$; it is now $7000+500+60$. See that annexing a zero *changes* the *place of each digit*, and causes it to signify *10* times as much as it did before. Show what happens in each of the following:

$75\times100=7500$; $846\times1000=846000$

Multiplying when there are zeros in the multiplicand

(1) (a) $2\times304=(2\times300)+(2\times4)=600+8=608$

(b) $\begin{array}{r} 304 \\ 2 \\ \hline 600 \\ 8 \\ \hline 608 \end{array}$ (c) $\begin{array}{r} 304 \\ 2 \\ \hline 8 \\ 600 \\ \hline 608 \end{array}$ (d) $\begin{array}{r} 304 \\ 2 \\ \hline 608 \end{array}$

(2) (a) $3\times209=(3\times200)+(3\times9)=600+27=627$

(b) $\begin{array}{r} 209 \\ 3 \\ \hline 600 \\ 27 \\ \hline 627 \end{array}$ (c) $\begin{array}{r} 209 \\ 3 \\ \hline 27 \\ 600 \\ \hline 627 \end{array}$ (d) $\begin{array}{r} 209 \\ 3 \\ \hline 627 \end{array}$

(3) (a) $3\times4060=(3\times4000)+(3\times60)=12000+180=12180$

(b) $\begin{array}{r} 4060 \\ 3 \\ \hline 12000 \\ 180 \\ \hline 12180 \end{array}$ (c) $\begin{array}{r} 4060 \\ 3 \\ \hline 180 \\ 12000 \\ \hline 12180 \end{array}$ (d) $\begin{array}{r} 4060 \\ 3 \\ \hline 12180 \end{array}$

Multiplying by a number of two digits

23×123 *n*

$123=100+20+3$

$23=\quad 20+3$

Below, in (a) and (b), are shown all partial products.

(a) $\begin{array}{r} 123 \\ 23 \\ \hline 2000=20\times100 \\ 400=20\times20 \\ 60=20\times3 \\ 300=3\times100 \\ 60=3\times20 \\ 9=3\times3 \\ \hline 2829 \end{array}$ (b) $\begin{array}{r} 123 \\ 23 \\ \hline 9=3\times3 \\ 60=3\times20 \\ 300=3\times100 \\ 60=20\times3 \\ 400=20\times20 \\ 2000=20\times100 \\ \hline 2829 \end{array}$

(c) $\begin{array}{r} 123 \\ 23 \\ \hline 369=3\times123 \\ 2460=20\times123 \\ \hline 2829 \end{array}$ (d) $\begin{array}{r} 123 \\ 23 \\ \hline 369 \\ 246 \\ \hline 2829 \end{array}$

In (c) three partial products are combined in 369, and three in 2460. In (d) the zero is dropped from 2460, and we have the usual form of multiplication. The full expression of the products, as shown in (a) and (b), helps the young student to get the *meaning* of multiplication, and should precede the more concise form, which tends to disguise the meaning.

$3008\times9863=(3000\times9863)+(8\times9863)$

(a) $\begin{array}{r} 9863 \\ 3008 \\ \hline 29589000=3000\times9863 \\ 78904 \qquad 8\times9863 \\ \hline 29667904 \end{array}$

(b) $\begin{array}{r} 9863 \\ 3008 \\ \hline 78904= \quad 8\times9863 \\ 29589000=3000\times9863 \\ \hline 29667904 \end{array}$

In (b) we see that the three zeros at the end of the second partial product need not be put down if the digits 9, 8, 5, 9 and 2 are put in their proper places. So we may have the problem in the usual form:

$$\begin{array}{r} 9863 \\ 3008 \\ \hline 78904 \\ 29589 \\ \hline 29667904 \end{array}$$

In teaching the child multiplication, there should be much work done in which the *zeros are set down, showing what the real problem is.* Through this he will the more quickly see why they need not be expressed, and find the proper *place* for the first digit.

Testing Multiplication. The child may use the two methods, one as a test for the other. He may multiply by the usual method, and test the work by employing the method in which he writes partial products in full, or he may work by the "long" method and test by the usual method. It is a safer method of testing

than division, and is much more pleasing. *Children enjoy testing their work by this method.*

$628 \times 137 = n$

Work	Test
628	628
137	137
4396	56
1884	140
628	4200
86036	240
	600
	18000
	800
	2000
	60000
	86036

In the early days of the work, drawing on cross-section paper may be used to great advantage to clarify the multiplication and to test the work. For example, $28 \times 17 \times n$:

28
17
$200 = 10 \times 20$
$80 = 10 \times 8$
$140 = 7 \times 20$
$56 = 7 \times 8$
476

The drawing (Fig. 2) shows all the partial products as areas.

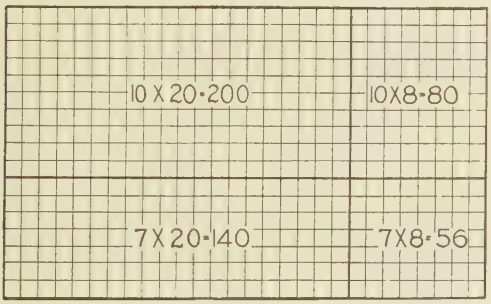


FIG. 2

One child may test another's work by drawing, or one may work the problem by drawing, and another test it by numbers. The cross-section paper is most valuable in this work. Testing in the two ways here suggested adds zest to the work, arouses a general interest in each individual's work, and brings about a feeling of responsibility on each student's part that is not felt when he must ask the teacher, or mother or father, for approval of his answer. For method of proof refer to DIVISIBILITY OF NUMBERS, subhead *Casting out of 9's.*

Problems. 1. Mollie spends 6¢ a day; how much does she spend in 7 days? 8 days? 11 days?

2. Home-made bread is 12¢ a loaf. What will 3 loaves cost? 5 loaves? 8 loaves?

3. Eggs are selling 52¢ per dozen. How much will a woman get who sells 16 dozen?

4. How many square feet in a floor 24 feet long and 18 feet wide? At 12¢ per square foot what will it cost to floor it?

5. A farmer has 27 acres of onions and the yield is 516 bushels per acre. What is the entire yield?

Solution of Problem 4

Length = 24 feet
Width = 18 feet
Number of square feet = $24 \times 18 = 432$
Cost = $432 \times 12¢ = \$51.84$

Solution of Problem 5

Number bushels on 1 acre = 516
Number bushels on 27 acres = $27 \times 516 = 13932$

Some Interesting Quick Multiplications

(a) 65 × 65 = 4225 (b) 95 × 95 = 9025 (c) 75 × 75 = 5625

Explanation. 5×5 is 25. Add 1 to the tens of the multiplier and take the product of the tens. In (a) this product is 7×6, or 42; in (b) 10×9, or 90; in (c) 8×7, or 56.

(d) 78 × 72 = 5616 (e) 84 × 86 = 7224 (f) 49 × 41 = 2009

Explanation. Take product of the units: $2 \times 8 = 16$, $6 \times 4 = 24$, $1 \times 9 = 9$. Add 1 to the tens of the multiplier and take product of the tens: in (d) $8 \times 7 = 56$, in (e) $9 \times 8 = 72$, in (f) $5 \times 4 = 20$.

(g) 105 × 105 = 11025 (h) 107 × 103 = 11021 (i) 106 × 104 = 11024

(j) 205 × 205 = 42025 (k) 307 × 303 = 93021 (l) 608 × 602 = 366016

The same explanation holds in these last six as above; for example, in (k) the product of the units is 3×7, or 21; add 1 to the tens of multiplier and the product of the tens is 31×30, or 930. The reason for this is evident in the following: $75 \times 75 = (70 \times 70) + (5 \times 70 + 5 \times 70) + 5 \times 5$. But $5 \times 70 + 5 \times 70 = 10 \times 70$ and $70 \times 70 + 10 \times 70 = 80 \times 70$, which we get by adding *1* to the *tens* of the multiplier. It is seen also in the following: $87 \times 83 = (80 \times 80) + (7 \times 80 + 3 \times 80) + 3 \times 7$, which $= 80 \times 80 + 10 \times 80 + 3 \times 7$, which $= 90 \times 80 + 3 \times 7$.

Children and older students enjoy this free play with numbers, and like to mystify others with their seeming magic in performing rapid multiplications. A.H.

MUMMY, *mum'i,* an embalmed body, preserved by the process used by the Egyptians in preparing their dead for burial. The bodies

of the wealthy received greater attention than the bodies of the poor. Embalmers were employed in various capacities to operate upon the bodies of the rich. The brain and bowels were removed, the body was washed and salted, and after certain other processes not now

EGYPTIAN MUMMIES

known was steeped for seventy days in a solution of natron (sodium carbonate). It was then washed, and each member of the body was wrapped separately in linen. The head received special attention, having several folds of muslin glued to the skin, and the whole head was enveloped in fine plaster. The bodies of the poorer classes were merely dried with salt or natron and wrapped in coarse cloths.

This process of embalming is now lost to the world, but the state of preservation in which these bodies are found after several thousand years shows that the Egyptians were masters of this profession. In some countries the conditions of soil and atmosphere are alone sufficient to preserve a body with the general appearance of a mummy. A large number of mummies, not only of human bodies, but of animals and of fish, have been found in Egypt, and many have also been discovered in Peru and Mexico. See PYRAMIDS; EGYPT, subhead *Ancient Egypt*.

MUMPS, a contagious disease occurring at any age except babyhood and old age, and manifested principally by swelling of the gland below and in front of the ear. About one to two weeks elapse after exposure, and then a pain is felt below and in front of the ear; there is also difficulty in swallowing. Swelling of the painful region comes on rapidly; the disease may involve one side only or both. This swelling makes it difficult to open the mouth or to chew. The swelling begins to subside at the end of four or five days, and if both sides of the throat have been affected, the patient never has a second attack. Rest in bed until the patient is entirely well will usually ward off complications, and should be insisted on. Warmth applied to the swelling, and medicine to relieve fever, prescribed by a physician, are measures it is well to carry out. These cases always get well. W.A.E.

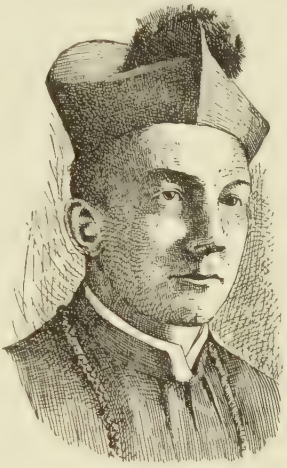
MÜNCHHAUSEN, *münK'hou zen,* HIERONYMUS KARL FRIEDRICH, Baron (1720-1797), a German soldier and cavalry officer, who holds the unique reputation of being one of the greatest exaggerators that ever lived. He was born in Bodenwerder, Hanover, and in his youth served as a cavalry officer in the Russian army. His spirit was adventurous and his imagination unlimited, and he gave a ridiculously exaggerated account of his remarkable adventures and exploits in the Turkish campaign of 1737-1739. These tales were gathered by Rudolph Erich Raspe, a German exile, who published the first English edition in 1785, naming it *Baron Münchhausen's Narrative of His Marvelous Travels and Campaigns in Russia.* Another standard English edition was published by Shore in 1872, with illustrations by Doré and Gautier. On account of their humor, the stories have been very popular.

MUNCIE, *mun'si,* IND., the county seat of Delaware County, is situated in the east-central part of the state, sixty miles south of Fort Wayne and fifty-four miles northeast of Indianapolis. It is on the west fork of the White River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Lake Erie & Western, the Chesapeake & Ohio of Indiana, the Fort Wayne, Cincinnati & Louisville, the Pittsburgh, Cincinnati, Chicago & Saint Louis, and the Central Indiana railroads. Five interurban lines extend to Indianapolis, Fort Wayne and other cities. The area of the city exceeds four square miles. In 1910 the population was 24,005; in 1920 it was 36,524.

Muncie has McCullough and Heekin parks, a courthouse, Federal building, Carnegie Library and three hospitals, and is the seat of the Muncie Normal Institute. The development of the city as an important manufacturing center is due to its location in the gas belt of the state and near convenient coal fields. Glass and fruit jars, iron and steel, automobiles, silver and silver-plate goods, underwear and clothing, lawn mowers, caskets, steam boilers, gas engines and supplies are extensively manufactured. In 1920 there were 121 factories, employing $22,116,000 capital.

Muncie was named after the Munsee Indians. The town was settled about 1833 and became a city in 1865. J.E.F.

MUNDELEIN, *mun'de lin,* Most Rt. Rev. George W. (1869-), a prelate of the Roman Catholic Church in America, who bears the distinction of being at various times the youngest monsignor, the youngest bishop and the youngest archbishop in the United States. He was born in Brooklyn, N. Y., was graduated at Manhattan College, New York, when twenty, and went to Rome to study at the College of the Propaganda. He was ordained a priest in 1895, was appointed monsignor in 1905, and the following year was made a member of the Ancient Academy of the Arcade, the first American to receive the honor. In 1908 he received the degree of Doctor of Sacred Theology, was consecrated auxiliary bishop of Brooklyn in 1909, and was chosen as archbishop of Chicago November 29, 1915. In the latter city he has the distinction of presiding over the most populous Roman Catholic diocese in the world. Archbishop Mundelein was the first prelate of German descent chosen to preside over the Chicago diocese.



ARCHBISHOP MUNDELEIN

MUN'GOOSE. See Mongoose.

MUNICH, *mu'nik,* in German München, *mün'Ken,* is one of the finest cities of Germany and perhaps the richest in its treasures of art. It is the capital of Bavaria, and is situated on an extensive plateau about 1,700 feet above sea level, on the southern bank of the Isar River. Munich has become world-famous for its great school of painting, and as a musical center. It was a city of little celebrity until the reign of King Ludwig I (1825-1848), who devoted himself to its beautifying. Now it is made up of an endless succession of magnificent palaces, churches and public buildings, representative of every style of architecture, and each worthy of special description. In addition to its fine university, Munich is richly endowed with many special schools and institutes for scientific and literary study. The city is also of commercial importance, and its stained-glass works, iron, brass and bell foundries, lithographing and engraving works, and factories for the manufacture of optical and mathematical instruments are celebrated. Of equal fame are the enormous breweries of Bavarian beer, about forty-five in number, all under royal control.

The most imposing structure of the many which house fine collections of art is the Old Pinakothek, containing paintings by old masters, as well as engravings and drawings and a priceless collection of antique vases. The New Pinakothek is celebrated for the great frescoes representing the development of art; and it contains a vast collection of paintings by modern artists. The Glyptothek is devoted to sculpture, ancient and modern. The famous Bavarian National Museum illustrates the history of civilization and art. The Royal and National Library contains over 1,100,000 volumes and over 50,000 manuscripts. The Royal Palace, which forms an extensive series of buildings, has many magnificent apartments and artistic treasures; its curiosities include crystals, miniatures and a fantastic shell grotto. The festive halls are decorated with paintings from the *Odyssey.* The Königsbau, a part of the New Palace, in the style of the Pitti Palace at Florence, is noted for the series of frescoes by Schnorr, illustrating the Nibelungenlied.

The Temple of Fame is of interest not so much for its busts of illustrious Bavarians as for the wonderful statue of *Bavaria,* sixty-five feet high, standing at the head of the staircase on the terrace leading to the hall. Connected with the Royal Palace are the Court Church and the Court and National Theater, one of the largest theaters in Germany. Adjoining the palace is the Court Garden, having arcades adorned with frescoes. A short distance beyond is the English Garden, a beautiful park covering 600 acres. The famous Gasteig promenades are along the right bank of the Isar. The street types are of especial interest to the thousands of visitors who throng Munich annually.

Thus there is much of interest in this city of architectural magnificence. Most of the modern buildings have been constructed along the lines of famous structures of other countries and eras, so, as one well-known writer has said, "a walk through Munich affords a picture of the architecture and art of 2,000 years." Population, October, 1919, 630,711. R.D.M.

MUNICIPAL, *mu nis' i pal,* **GOVERNMENT,** a term which popularly relates to the self-government of a city, with its many problems of local control, but which refers no less truly to the government of any incorporated village. In almost all jurisdictions a village or city is a thickly-populated section of a township whose growing needs require more complicated government and more financial strength than the remainder of the township. A city needs sidewalks, pavements, waterworks, gas plants and other modern necessities, and the needs of the village are much the same, although on a less extensive scale. Farming communities naturally object to paying taxes to support such enterprises in these thickly-populated sections of their township, inasmuch as they receive no direct benefit from such investments. A growing community is therefore empowered under nearly all state and provincial legislatures to form a corporation of all the people within certain territorial limits, which sets the prescribed area apart from its township for purely local government. The written permit to form a city, or village, government is called a charter, and is authorized by the state or province; this charter specifies distinctly the powers and limitations of the new local government.

In some states and provinces a community must have 10,000 people before it can apply for a city charter, and 500 people before it can separate from the rest of its township and organize a village government. This rule varies so much, however, that no definite statement can be made respecting it. In some states a community may organize a city government with as few as 1,000 inhabitants. While incorporation increases local expenses, yet it is true that in a village the president and members of the common council usually receive no compensation; the same is true in many small cities, but in cities of the first class the officials are usually paid adequate salaries.

Village Government. A village has for its executive head a mayor or president; its legislative department is the common council, composed of five or more members elected for one or two years. The charter provides also for a village clerk, treasurer, assessor, street commissioner and usually a village marshal. Any constable in a township may also act as peace officer in a village. The council passes ordinances which are in every sense laws binding upon all the people within the limits of the village. A village may borrow money up to a certain amount to build roads, pave streets, build and equip schoolhouses, municipal buildings, and the like.

City Government: Council-Mayor Plan. A city government is like that of a village except that it is more complex, because of the greater number of people whose interests demand protection, and whose needs are more complex. Except in cities under the commission plan, or the city-manager plan, the chief executive officer is the mayor. Legislative powers are vested in the common council, or board of aldermen. In order that representation in this body may not be concentrated in one locality, the city is sometimes divided into sections called wards, the people of each ward electing one or two members, usually for terms of two years. In other cities ward lines are abolished, and all members of the council are chosen at large, that is, by the voters of the entire city.

There is also a city clerk, a treasurer, assessor and tax collector; the department of streets is in charge of a street commissioner, and the department of public safety has a police force as large as necessary, with a chief of police at its head. This official is generally appointed by the mayor and responsible to him. The head of the street department is sometimes appointed and sometimes elected by the people.

New Types of City Government. Students of government are finding in the cumbersome city organizations serious menaces to the welfare of the community. The average city government is one of divided responsibility, although nominally the mayor is at the head of every department except the common council, or board of aldermen. Divided responsibility frequently carries with it abuses of power and privilege. A change in the governmental machinery which has found favor in a large number of cities is the so-called commission form of government, whereby responsibility for the entire civic organization is placed in the hands of five or seven men. W.B.G.

Consult Pollock and Morgan's *Modern Cities;* Munro's *The Government of American Cities;* Howe's *The Modern City and Its Problems.*

Related Subjects. The following articles in these volumes will be of interest in this connection:

Alderman	Commission Form of Government
City	Mayor
City Manager	Municipal Ownership
City Planning	

MUNICIPAL OWNERSHIP signifies ownership and operation by a city of such public necessities or conveniences as waterworks, light-

ing systems, street railways, telephone systems, and the like, as opposed to private control of those same utilities. There are instances in which ownership and operation are not combined; the city, as owner, may lease operating privileges to private companies, under such rentals and restrictions as may be agreed upon.

The economic principle of publicly-owned utilities has been debated for many years. It is conceded that a city government is obligated to provide in some way the public facilities required for the conduct of business and for some of the universal demands of the homes of the people. Streets belong to the public; they must be used in part, on the surface and above and below, for means of transportation, for water-supply equipment, lighting and sewer systems, and for that newest modern necessity, the telephone. Either the city must fully control the streets by control of the public utilities placed in them, or it must relinquish a measure of its rights to private corporations.

One street-car system; one lighting plant; one telephone system; one system for supplying water—a single organization to control each of these necessities has come to be the rule in most cities. Service to the whole public in any line is regarded as a natural monopoly; there should not be competing companies. As an illustration, one telephone system in a city is a necessity; two competing companies invite confusion, are vexatious, and neither can fully serve the public. These things which are natural monopolies, if left under private ownership are sometimes difficult to control in the interests of all the people; service cannot be commanded of a grade to meet demands; not always can prices be controlled. Ownership and operation by the city place the public in command of its utilities; the vote of the people or their representatives determines the extent of service, its quality, the cost. The latter item, if affairs are wisely conducted, may be less than under private ownership, for the city does not aim at returns larger than necessary to cover depreciation. If politics can be kept out of the management, the quality of the service will depend solely upon the zeal of the city's servants.

In most communities those who object to municipally-owned utilities have valid reasons for their opposition. A city corporation is a business organization, and requires the same careful scientific and resourceful management that characterizes successful private enterprises. The men chosen to manage a city's affairs are sometimes of poor ability; some of them could not safely be placed in command of any large, private business, and should not be given control of a city's operating department. Too frequently there is the thought in the minds of a certain class of officeholders that a city is their legitimate prey, that the people are careless and will not hold them to careful account, with the result that public business suffers, while taxes mount high. Municipal ownership adds very largely to the number of a city's employees, measurably increases the responsibility of those in power, and demands the highest ability and strictest integrity in official places.

The people of the United States are not yet fully persuaded that their city governments should undertake any service except the protection of the life, property and health of its citizens. Water is supplied by the municipality in most of the large cities of the United States, as well as in many smaller ones. Of 175 cities with over 25,000 population, 133 own their waterworks. Electric-lighting plants are generally owned and operated by private companies; about 800 cities own electric-lighting plants as compared with 3,000 plants under private ownership. Municipal control of other public utilities has made even less headway. It would be difficult in most cities to establish with success municipal telephone systems; one gigantic company has a grasp on this natural monopoly from coast to coast. Local independent companies are numerous, but on their own ground they compete with their powerful national rival, and both emphasize the economic waste resulting from competition of this nature.

By far the greater number of water systems of Canada are owned by the people, and in both Canada and Great Britain the theory of municipal ownership has wider acceptance than in the United States. Some countries carry the theory farther; if a city may control a necessity, why may not the state do the same? Therefore nearly every country of continental Europe, particularly Germany and France, owns one or more railroads, as well as telegraph and telephone systems. The government's relation to such an enterprise is the same as the position of the United States with respect to its postal system. The most advanced communities in the world in the direction of municipal ownership of public utilities are the cities of New Zealand. W.B.G.

Consult Porter's *The Dangers of Municipal Ownership;* Towler's *Socialism in Municipal Government.*

MUNKÁCSY, *moon' kah che,* MIHÁLY (1846-1900), an Hungarian painter, whose works are characterized by great dramatic power, vigor and strength. His real name was MICHAEL LIEB. Munkácsy's paintings divide themselves into three classes: historical pieces, of which *Milton Dictating Paradise Lost to His Daughters, Christ Before Pilate* and *Mozart's Last Moments* are his best known; those depicting Hungarian life, including *The Condemned, War-Time, Night-Roamers* and *Village Heroes;* and those illustrating social life of Paris, among which are *Father's Birthday* and *Two Families.* It took years of hard work, entailing many privations, before he was able to fulfil his ambition to study at Munich and Düsseldorf. In 1872 he settled in Paris, where he applied himself closely to his art.

MUNROE, *mun ro',* KIRK (1856-), an American story-writer, whose books for boys have been very popular, was born near Prairie du Chien, Wis., educated in the common schools, and in civil engineering at Harvard University. During later work on the Northern and Southern Pacific railways he became acquainted with wild western life, which he afterward pictured with such effect in his books. For a time he lived in New York, and was the first editor of *Harper's Young People,* but in 1882 removed to Southern Florida, and gave himself up to story-writing. His books include *The Flamingo Feather, The Coral Ship, Dory Mates, The Belt of Seven Totems, Outcast Warrior* and *For the Mikado.* His books are wholesome, not given to sensation, but not always accurate in their historical phases.

MUNSEE, *mun' se,* one of the three principal divisions of the Delaware Indians, the others being the Unami and Unalachtigo. The Munsees are frequently called the Wolf tribe of the Delawares because the wolf is regarded as their tribal symbol (see TOTEM). They themselves were in early times divided into several bands, the most important being the *Minisink,* whose name comes from an Indian word meaning *at the place where stones are gathered together.* They formerly occupied the land about the headwaters of the Delaware River in New York, New Jersey and Pennsylvania, and also had control of an extensive tract along the west bank of the Hudson River. The Munsees who dwelt on the Hudson were conspicuous in early New York history, but when the white settlements increased they joined their relatives along the Delaware. By a fraudulent treaty, known as the *Walking Purchase,* the majority of the Munsees were driven from the Delaware about 1740, and settled on lands along the Susquehanna River, which were assigned to them by the Iroquois. They are now widely scattered throughout the United States and in Canada.

MÜN'STER, one of the best preserved old towns in Germany, about 100 miles north-northeast of Cologne, is the capital of Westphalia. Its chief interest lies in the numerous remains of medieval architecture, particularly the Gothic cathedral; several fine old churches; the castle with its pleasure grounds and botanical gardens; and the sixteenth-century town wine-cellar, in which are preserved some rare paintings of the old German school. The University of Münster (Roman Catholic) has a library of about 225,000 volumes. The industries include the manufacture of woolen, cotton and silk fabrics and paper, in addition to dyeing, printing and enameling. Population in 1919, 100,452.

MÜNSTERBERG, *mün' ster berK,* HUGO (1863-1916), a German-American psychologist who was a leader in the experimental branch of his subject. His name became more familiarly known than the names of most philosophers, for he wrote articles and books, in popular style, on phases of psychology in which there is a general interest. His discussion, for instance, of the psychology of testimony, attracted wide attention, as did also his work on *Psychotherapy,* and especially his book *Psychology and Industrial Efficiency,* in which he proposed mental tests for vocational guidance which have proved of practical value.

Münsterberg was born in Danzig, received degrees at Leipzig and at Heidelberg, and taught for several years in the University of Freiburg. In 1892 he accepted the position of professor of psychology at Harvard University, and from the first he turned his attention to the organization of that psychological laboratory which is one of the glories of Harvard. From being interested chiefly in the relation of physiology to psychology he constantly widened his view until it embraced the relationship of psychology to all phases of life. Particularly acute were the deductions which he drew from his study of American life and ideals. He wrote much on various phases of his subject, his published works including *Psychology and Life, American Traits, Eternal Values, Science and Idealism, On the Witness Stand, American Patriotism* and *Psychology, General and Applied.* In 1910-1911 he returned to Germany as Harvard exchange professor at the University of Berlin.

When the War of the Nations broke out in 1914, Münsterberg was severely criticized, both in the United States and Great Britain, for his extreme pro-German views, which were openly expressed in *The War and America*. Harvard University, however, upheld him, declaring that no member of its faculty should be dismissed for making use of his right to freedom of speech, and he continued teaching there until his death, which occurred suddenly from heart failure.

MURADABAD, *moo rud ah bahd',* the capital of the district of the same name, in the Northwest Provinces of British India. The city is situated on the banks of the Ramganga River and contains several noted buildings, including an Indian mosque built in 1631, the Anglican Church of Saint Paul and the American Methodist Mission. The metal work of Muradabad, especially its engraved brass, is of exquisite workmanship and beauty. The city is the center of an extensive local trade in sugar, wheat and rice. The population in 1921 was 82,713. The city was founded in 1625 by Rustan Khan, and overlooking the river are the ruins of his fort.

MU'RAL CIRCLE, an astronomical instrument used for the calculation of the right ascension and declination of stars. It has now been superseded by the more reliable meridian circle. See Astronomy.

MURAT, *mu rah',* Joachim (1767-1815), a French marshal and cavalry leader, one of the best generals in the army of Napoleon I. After enlisting in a cavalry regiment he attached himself to Napoleon and in 1795 followed him to Egypt and Italy. His rise was rapid, and in 1799 he was appointed general of division by his chief, who also gave him command of the Consular Guard. In 1800 he married Caroline, the youngest sister of Napoleon, and in 1804 became governor of Paris. On the establishment of the empire he was made marshal and contributed to the French triumph at the famous battle at Austerlitz. In 1808 Napoleon placed him at the head of the army in Spain, and on August 1 of that year he was proclaimed king of Naples, under the name of Joachim I. He declared war on Austria after Napoleon's escape from Elba, but was defeated at Tolentino, and after the Battle of Waterloo he fled to Corsica. Later he made a foolhardy attempt to recover the kingdom of Naples, for which he was tried by a court-martial and shot.

MURATORE, *mu ra tohr',* Lucien (1878-), a French operatic singer who ranks with the greatest tenors of modern times. This gifted artist—whose acting and singing are equally noble and impressive—is a native of the city of Marseilles. After completing a musical course in the conservatory of that city, he studied in Paris and appeared there with Calvé in *La Carmélite*. This was the beginning of a career that has been not only successful but brilliantly so. During the three seasons from 1912 to 1916 he sang with the Chicago Grand Opera organization. His portrayal of the rôles of Don José in *Carmen* and of Romeo in *Romeo and Juliet* possibly aroused the greatest interest, and critics agreed that his work in the latter opera, together with that of Galli-Curci, who sang the leading soprano part, equaled the finest achievements of those earlier stars of grand opera—Jean de Reszke and Melba. Other operas in his repertoire include *Pagliacci, Manon* and *Francesca da Rimini*. His wife, Lina Cavalieri (which see), is one of the most beautiful and accomplished singers in opera.

MURCIA, *mur'shi a,* a city in Southeastern Spain, capital of the province of the same name. It lies in the midst of one of the most fertile and most beautiful valleys of the country, on both banks of the Segura River, twenty-five miles west of the Mediterranean Sea. Promenades and pleasure gardens stretching along the river banks, and the luxuriant vineyards, and mulberry, fig and olive groves of the fruitful valley lend charm and interest to the city. Murcia has been successively under the control of the Romans, Moors and Spaniards, and one may still see traces of its former days in a few narrow streets with their quaint balconied houses. The most interesting feature of the place is the great cathedral, in Gothic-Romanesque style, begun in the fourteenth century. The palace of the bishop is also notable, being one of the finest in Spain. Silk-making is the most important industry. There is a thriving trade in grain and fruit, and the city has manufactures of woolen goods, gunpowder, soap, leather, hats and musical instruments. Population, 1919, 123,936.

MUR'DER, one of the few crimes still punished, in many countries, by death, may be defined as the malicious killing of a human being (see Malice; Capital Punishment). Except in the United States, the law recognizes no classes or degrees in murder. But most of the states of the American Union have by legislative enactment classified the crime in two or in three degrees. Murders of the first degree

include those cases where the act was committed with proven malicious intent. The second degree includes cases where, though ill will is present, murderous intent is not established beyond doubt. The third degree includes accidental killing by one engaged in a felonious act. The usual punishment for the first degree is death or life imprisonment; for the second degree, imprisonment for a long term; for the third degree, imprisonment for a period varying from three to five years.

Murder is ordinarily distinguished from *manslaughter* by the presence of *malice,* especially of *malice aforethought.*

Related Subjects. The reader is referred to the following articles in these volumes:

Capital Punishment	Criminology
Crime	Manslaughter

MURFREE, *mur'fre,* Mary Noailles (1850-), known in the literary world by the pen name of Charles Egbert Craddock, was born at Murfreesboro, Tenn. Early deprived of childhood sports because of lameness, she became an intense reader of books. During the War of Secession she was taken for safety into the Tennessee mountains, and there the curious primitive characters and simple life aroused her literary talent. In May, 1878, she began her contribution of vivid stories to the *Atlantic Monthly;* in 1884 came the collection *In the Tennessee Mountains,* which was followed by *Prophet of the Great Smoky Mountains, Keedon Bluffs, Old Fort Loudon* and *In the "Stranger People's" Country.* Her stories contain vivid presentations of strange scenes and eccentric characters, while her plots are full of vigorous action. She has made the Southern mountains a field of genuine literary importance in American literature.

MURFREESBORO, *mur' freez bur o,* or **STONE RIVER,** Battle of, a battle that ended the second year of the War of Secession, fought on the Stone River near Murfreesboro, Tenn., on December 31, 1862, and January 2, 1863, between a Federal force of about 41,000 under General Rosecrans, who had succeeded Buell in command, and a Confederate force of about 35,000 under General Bragg. On the first day of the battle the Federal forces were driven back; the entire right wing of the army was scattered, and some of the generals thought best to retreat; but Rosecrans announced his intention to "fight, or die here." On January 2, after the two armies had bravely held their ground with varying fortunes for nearly three days, Bragg retreated about thirty miles and stood as a barrier against the advance of the Federal troops toward Chattanooga, an important strategic point. Each army lost about 9,000 killed and wounded.

MURIATIC, *mu ri at'ik,* **ACID.** See Hydrogen Chloride.

MURIL'LO, Bartolomé Esteban (1617-1682), called the "Painter of Heaven," is one of the greatest of painters. Had he only given to the world his studies of the little sun-browned street urchin and gypsies he would have been famous, but his religious paintings far surpass these in beauty and depth of feeling. Unconscious of their rags, the little street beggars bask in the sun, relishing their macaroni or luscious fruits, or eagerly engaged in tossing coppers and playing other games the children love; while his monks, saints and Madonnas are famed for their wondrous spirituality.

MURILLO

The story of Murillo's early life is one of great poverty and suffering. He was born in Seville of humble parents whose struggles for existence were so great that they had little time to devote to their boy, but he was perfectly happy when allowed to draw upon the pages of his books or the walls of his poor home. Murillo began his life work by painting religious pictures for the fairs of Seville, and later executed commissions for the South American trade. Then he started on a long and tedious walk from Seville to Madrid, arriving there exhausted, friendless and penniless. However, he was blessed with an almost limitless fund of courage and a determination to succeed against all odds. Velasquez, his townsman, became interested in his work, and through his influence a new, wonderful world was revealed to the struggling young artist. Velasquez, at that time painter to the king, offered Murillo a home and gave him permission to work in his studio. But best of all was the privilege of studying and copying the treasures of the Royal Galleries.

Like all the painters of his day, Murillo had once dreamed of going to Italy. But when the opportunity came and Velasquez presented him with letters of introduction to the famous men

IMMACULATE CONCEPTION

IMMACULATE CONCEPTION. "An inspired man," the critics call Murillo, and everyone who looks upon his paintings of sacred subjects feels the justice of the praise. That he felt deeply, and therefore was able to make otners feel, is as apparent in his pictures as is his knowledge of drawing and his mastery of warm, soft coloring. His paintings for the most part show no struggle, as do many of those of Michelangelo, for instance, but diffuse an air of serene well-being. "We seem," says one writer in describing his pictures, "to exist in one of those happy moments when grief is afar off and when the sweetest affection of the human heart is gratified and all life is serene." It is this quality in his paintings which accounts in large measure for his vogue, for Murillo is one of the most popular of the great artists.

This particular picture is Murillo's latest and most finished presentment of the Virgin. With its sweetness and ideality, it has always been a favorite; during the Napoleonic wars Marshal Soult felt that he was bestowing a great boon on France when he brought it back from Spain at the close of his campaign there. Later, the French government bought it, paying for it about $125,000, the greatest sum ever paid for a picture up to that time.

L. J. B.

there, he declined, choosing rather to return to his home at Seville, where he remained for the rest of his life. His eleven large paintings for the convent of San Francisco brought him immediate fame and many other commissions. He founded the Academy of Seville in 1660 and acted as its president the first year. He painted *Saint Anthony of Padua* several times, the most famous canvas on this subject being the one in the Cathedral of Seville, representing the monk with arms outstretched to receive the Infant Jesus. The lilies in this painting are so real that it is said the birds flying about the cathedral have tried to peck at them.

Murillo's masterpiece, the *Immaculate Conception,* hangs in the Louvre. The Virgin is borne upward by heavenly zephyrs. She wears a flowing white robe and simple blue mantle. Out of the golden light, or peeping from behind soft clouds, are countless cherub faces, each having a special charm and interest. A faithful reproduction, much reduced in size, is shown in the accompanying color plate. Among the eight famous paintings for the almshouse at Saint Jorge are *Moses Striking the Rock, Abraham and the Angels, The Miracle of the Loaves and Fishes* and *Saint Peter Released from Prison. The Dice Players* is typical of his many famous presentations of Spanish children of the street.

In 1681 Murillo went to Cadiz. While there he received injuries in a fall from a scaffold which resulted in his death. He was buried in the Church of Santa Cruz, in Seville. Examples of his paintings are the treasures of the great galleries of the world. A stately bronze statue of him in the public plaza of Seville is pointed out to all visitors, for the Spanish people treasure the memory of this great master of painting. B.D.M.

Consult Stirling-Maxwell's *Annals of the Artists of Spain;* Curtis's *Velasquez and Murillo.*

MURRAY, *mur'a,* GEORGE HENRY (1861-), a Canadian statesman, since 1896 premier of Nova Scotia. He was born at Grand Narrows, N. S., and received his elementary schooling there, but later attended Boston University. In 1883 he was called to the bar of Nova Scotia, and for several years thereafter practiced his profession at North Sydney, N. S. His first appearance in public life occurred in 1889, when he was appointed a member of the provincial legislative council. Two years later he resigned to contest a seat in the Dominion House of Commons. After his defeat for this seat he was reappointed to the council, and at the same time became a minister without portfolio in the Liberal cabinet of William Stevens Fielding. In 1896, when Fielding was called to Ottawa to serve in the Dominion Cabinet, Murray succeeded him as premier of Nova Scotia. He also assumed the portfolio of provincial secretary. During its long service the Murray government has given special attention to the promotion of agriculture and immigration. In 1914 a determined effort was made to force the province to adopt prohibition, but Premier Murray's opposition finally led to a compromise in the form of a local option law.

MURRAY, JAMES (1719-1794), a British soldier and colonial administrator, the first British governor of Canada. Murray was the younger son of an English nobleman, and, like many younger sons, entered the army when he became of age, in 1740. After service in the West Indies, the Netherlands and Brittany, in the course of which he rose to the rank of lieutenant-colonel of the Fifteenth Regiment of Foot, Murray was sent to America in 1757 with his regiment. In the next year he commanded a brigade at the siege of Louisburg, and in 1759 he was one of the three brigadiers under Wolfe in the expedition against Quebec. In the great battle on the Plains of Abraham he commanded the left. After the British victory Murray was left in command of the city, which he successfully defended against a superior French army under General de Lévis.

In 1760 the king appointed General Murray governor of Quebec, and three years later, when French rule formally came to an end, governor of Canada. As governor Murray faced many difficult problems, nearly all of which centered about the relations between the English and the Indians (see PONTIAC) and the English official class and the French-Canadians. Murray seems to have been just beyond criticism, but some of his subordinates accused him of favoritism towards the French. Accordingly he was recalled to England in 1766, and was even compelled to stand trial, but was completely exonerated of any wrongdoing. From 1774 to 1781 he was governor of Minorca, which he surrendered to a combined force of French and Spanish troops after a seven-months' siege in the latter year. He was made a general in 1783.

MURRAY, SIR JOHN (1841-1914), a Canadian naturalist, geographer and deep-sea explorer, perhaps the foremost authority of his day on oceanography and marine biology. Sir John was born at Cobourg, Ont., attended Victoria

College there, and later studied natural science at the University of Edinburgh, in Scotland. His first practical experience in the field in which he became a leader was in 1868, when he visited the Arctic regions on a whaler for the purpose of studying their plant and animal life. From 1872 to 1876 he was one of the naturalists on the famous "Challenger" expedition, which explored the ocean basins and gave the world a new knowledge of its great water masses. On the return of the expedition he was appointed an editor to assist in the preparation of its reports, and in 1882 was promoted to the position of editor-in-chief. These reports, comprising fifty large volumes, were not completed until 1896. Two years later Queen Victoria knighted him. Sir John took part in a number of other important exploring expeditions and wrote numerous reports on the oceans. He was also the author of *The Ocean: A General Account of the Science of the Sea,* a highly entertaining account in language which is clear but not technical.

MURRAY, Walter Charles (1866-), a Canadian educator, since 1908 president of the University of Saskatchewan. He was born at Studholm, N. B., and was educated at the universities of New Brunswick, Edinburgh and Berlin. After completing his studies at Berlin in 1891, he returned to the University of New Brunswick as professor of philosophy and economics. A year later he was called to Dalhousie University, where he was until 1908 professor of philosophy and lecturer on education. Thereafter his abilities have found an outlet in the position of president of the University of Saskatchewan, which has become, in a large degree through his efforts, one of the great Canadian universities. Murray is the author of *Studies in Mind Growth* and *Local Government in the Maritime Provinces.*

MURRAY RIVER, the largest river in Australia, rises in the Australian Alps, near the eastern boundary of Victoria. It is about 1,500 miles long, and drains nearly the entire southeastern quarter of the continent. In its upper course it is a rushing mountain stream, but it slows down and widens as it reaches the great Australian Plain. For about two-thirds of its course it flows in a northwesterly direction, forming the boundary between Victoria and New South Wales. It then flows into South Australia, passes through the shallow Lake Alexandrina and empties into the Indian Ocean through Encounter Bay. During the rainy season the Murray is navigable over most of its course as far as Albury, New South Wales. Although there are many inland ports along its banks which do a large trade, the mouth is impeded by sand bars and so is inaccessible for large steamers. Its chief tributaries are the Murrumbidgee and the Darling rivers.

MURRUMBIDGEE, *mur um bid' jee,* an Australian river that flows across the southern part of New South Wales. It rises in the Australian Alps and twists and winds northward and westward for 1,350 miles until it reaches the Murray River (which see). During the wet season it is navigable for light steamers for 500 miles, but during the dry season it is of little value except to a few ranches along its course.

MUSCAT, or **MUSKAT,** *mus kaht',* the capital of the independent state of Oman, Arabia, and a seaport of considerable strategic and commercial importance. It is situated on the Gulf of Oman, in the southeastern part of the country. Muscat is under British political influence and has been used as a coaling station by France since 1898. Its situation at the foot of high cliffs makes it one of the hottest places in the world; the excessive heat forces many of its merchants to reside in Mattra, about three miles distant, where there are cooling sea breezes. The inhabitants of Muscat carry on a prosperous trade in dates, mother-of-pearl, dry fish and salt. Muscat and the neighboring town of Mattra have a combined population of about 24,000.

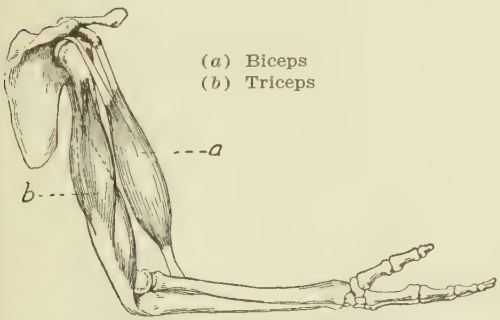
MUSCATINE, *mus ka teen',* Iowa, the county seat of Muscatine County, situated on the eastern state boundary, on high bluffs along a great bend of the Mississippi River. It is twenty-five miles west and south of Davenport, with which it is connected by an electric interurban line, and is on the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific and the Muscatine North & South railroads. A large bridge crosses the river at this point. The area of the city is nearly seven square miles. In 1910 the population was 16,178; in 1920 it was 16,068, a slight decrease.

Its industrial establishments include foundries and machine shops, sheet iron, boiler and engine works, pickle and canning factories, and manufactories of pearl buttons (an extensive industry using fresh-water clam shells exclusively), lumber products, pottery, boxes and packing cases, carriages and tile. The city has a public park, Musser Public Library, hospitals and a soldiers' monument. The place was settled in 1833 and was incorporated in 1839. It is governed under a charter adopted in 1851.

MUSCLE READING. See MIND READING.

MUSCLES, *mus''lz.* When a person walks from one place to another, picks up his food, puts on his clothing or performs any other of the countless movements that are a part of everyday life he calls to service certain important bodily organs known as *muscles.* There are over 500 of these in the human body, and they constitute fully half its weight. They are the lean flesh of man; the muscles of a cow form the lean meat of beef, and those of a pig the lean meat of pork. There are two great classes of muscles, *voluntary* and *involuntary.* Intermediate between these is heart muscle, which, though it acts like an involuntary muscle, is similar to a voluntary muscle in structure.

Voluntary Muscles. These are the muscles which move according to the will of a person and are under his direct control, as the ones used in walking, swimming or playing ball. These muscles are for the most part placed next to the bones, and they serve not only as movement organs, but also to round out the figure and so impart beauty to the body. In its typical form such a muscle consists of a soft red middle portion which tapers towards each end; it is attached to some part of the bony framework by white, inelastic cords called *tendons* (which see). When the middle portion is stimulated through its nerves it contracts, and in so doing it exerts a pull on the tendons. This pull is then transmitted to the part to be moved. A muscle which has two divisions at one end is called a *biceps* muscle (two-headed),



BICEPS AND TRICEPS MUSCLES

as that in the front of the arm between the shoulder and elbow. When the elbow is bent this muscle swells and becomes thicker and harder; a biceps "hard as a rock" is the boast of many a schoolboy who leads an active life. A *triceps* (three-headed) muscle, like that at the back of the upper arm, has three divisions.

According to structure a voluntary muscle is made up of bundles of fibers about an inch long and about $\frac{1}{500}$ of an inch wide, each the development of a single cell. Under the microscope these fibers are seen to be marked crosswise with fine alternating bands of dark and light. From this comes the name *striated* (striped) muscle, which is another term for voluntary muscle. The bundles of fibers are enclosed in an elastic sheet of thin membrane called the *sarcolemma,* a word meaning *rind* or *skin;* they are supported and protected by connective tissue, penetrated by nerves from the cerebrospinal system and supplied with blood vessels. Some voluntary muscles, such as those which are concerned in the process of breathing, are both voluntary and involuntary in respect to function. That is, breathing may be controlled by the will, but ordinarily it goes on mechanically, and during slumber its action takes place without the least exercise of the will.

Involuntary Muscles. The involuntary muscles are those whose contractions are beyond a person's control, and which lie in the walls of such organs of the body as the stomach, intestines and arteries. No effort of the will can move such muscles. The muscles which by their contraction and relaxation move the food about in the stomach belong to this class. Structurally they are said to be *unstriated,* or not striped, for they lack the crossbands characteristic of striped muscles. Involuntary muscles are made up of elongated, spindle-shaped cells, each of which tapers towards its ends and has a central nucleus. These cells vary in length from $\frac{1}{500}$ to $\frac{1}{100}$ of an inch, and are from $\frac{1}{6000}$ to $\frac{1}{4000}$ of an inch wide. Involuntary muscles are penetrated by nerves from the sympathetic system (see NERVOUS SYSTEM).

Muscular Development. Weak, flabby muscles are an indication of physical inactivity, for muscles grow larger and stronger through use. Systematic development of these organs stimulates the fundamental processes through which life is sustained—digestion, circulation and breathing—and the whole body will therefore grow more vigorous if the muscles are properly exercised. For this reason, walking, rowing, swimming and other forms of exercise and recreation should be practiced by everyone, especially by those whose work keeps them inactive several hours each day. Boys and girls who have allowed themselves to grow stoop-shouldered can strengthen the weak and inactive muscles of the back by proper exercise;

this is immeasurably preferable to shoulder braces, for the latter weaken the muscles.

It should also be borne in mind that alcoholic drinks diminish both the strength and the enduring power of the muscular tissues, besides interfering with the accuracy and precision of their movement. Abstinence from such beverages and from tobacco, together with wholesome living and outdoor exercise, will give to the growing boy or girl that which has been considered the ideal state for mankind since the days of the ancients—"a sound mind in a sound body." W.A.E.

MUSCLE SENSE, or **MUSCULAR SENSE,** generally called the "sixth sense," is the one which tells us which muscles to use, where to direct their movement and how much force to put into the action. This sense can be cultivated to a great degree, and because of this it is possible to develop skill and dexterity in manual labor, dancing, skating or any form of physical expression. Both sensory and motor nerves are distributed through the muscles. The muscular sense is stimulated to action through the sensory nerves, which convey the impressions they receive to the proper brain centers, and these centers stimulate the motor nerves, which cause and control muscular action. The muscular sense may also be stimulated to action through the feelings; that is, in certain manifestations of joy, anger, etc. See Reflex Action; Senses, Special. W.A.E.

MUSES, *mu'zez.* As every river, mountain and tree had its particular deity, according to the ancient Greeks, so did every art and science, and the goddesses who presided over these latter were called the Muses. They were beautiful maidens, nine in number, the daughters of Jupiter and Memory, and they were grave or gay according to the special subject over which they presided. Thus Terpsichore and Thalia, Muses respectively of the dance and of comedy, were merry of aspect, while Melpomene, the Muse of tragedy, was of serious mien. At all the feasts of the gods on Olympus the Muses sang in chorus, often with Apollo, whose special attendants they were. The Muses and the departments over which they presided were, in addition to those mentioned above, Calliope, the department of epic poetry; Euterpe, lyric poetry; Erato, love poetry; Polyhymnia, sacred poetry; Clio, history; and Urania, astronomy. An ancient writer, beginning any weighty work, always called upon one of the Muses to assist him. Thus Homer, addressing Calliope, begins his *Iliad* with the words:

> Sing to me, goddess, the wrath, the wrath of Pelian Achilles.

In modern times the term *muse* is used generally to signify poetic inspiration. "My muse has deserted me!" exclaims the poet who cannot find the thoughts or words he seeks. F.J.C.

MUSEUM, *mu ze'um,* from the Greek word meaning *temple of the Muses,* is a building in which works of art, science or learning are displayed. This is the broadest use of the term. In popular phraseology it is more customary to speak of a building which houses scientific collections, historic relics, etc., as a *museum,* and to apply the term *gallery* to those containing works of art. The first museum was the famous University of Alexandria, which sheltered scholars from all parts of the civilized, pagan world. See Alexandria.

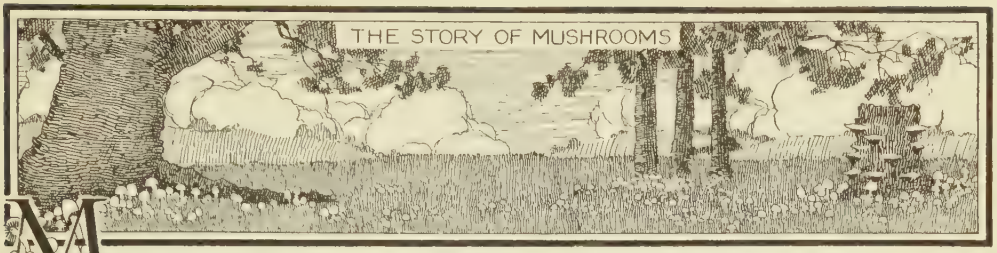
When learning languished, during the Middle Ages, museums were practically unknown, and such collections as existed were made in the most haphazard fashion. Indeed, the development of museums on the present imposing scale is quite recent. With the enormous extension of the democratic movement in the nineteenth century, these universities of the people began to be enriched with priceless treasures of art and learning. Their purpose is educational, and the ideal museum would exhibit, as far as possible, the whole complex history of culture. Such a museum is yet, of course, but an ideal in the minds of scholars.

Among the great museums of the world are the Vatican in Rome, the Louvre in Paris, the Uffizi and Pitti at Florence, and the British National Museum at London. The Smithsonian Institution at Washington was the first of the sort in the United States. Its success led to the establishment of the National Museum. Many of the great cities now have considerable collections, suitably housed. Among those worthy of note are the Carnegie Institute at Pittsburgh, the museum at Philadelphia, founded after the Centennial Exposition, the Museum of Natural History, Boston, and the Field Columbian Museum, Chicago.

Related Subjects. The reader is referred to the following articles in these volumes:

British Museum	National Museum of the United States
Education, subtitle *Educational Museums*	Painting
Field Columbian Museum	Pitti Palace
Louvre	Smithsonian Institution
	Uffizi

MUSEUMS, Educational. See subtitle, in article Education, page 1950.



MUSHROOMS, *mush'roomz.* Clammy and flowerless are the plants of the mushroom family, a branch of the great fungus group, yet they are among the most interesting and beautiful things to be seen on a tramp through woods or fields. The fruit seen above the ground assumes a vast variety of shapes, from the ordinary umbrella to the less familiar coral-like formation. In color mushrooms range from pure white to delicate pastel shades of pink and lavender; from pale yellow to flaming orange and brilliant red; from dull gray to velvety brown.

A spell of wet weather in spring, summer or fall always means a sudden increase in mushroom growth, for the plants require a great deal of moisture. The home they choose is decaying vegetable matter—generally a log or a piece of rotting wood, sometimes hidden under leaves or moss. It is the French word for *moss* that gives us the name *mushroom,* as well as the old-fashioned name *mushrump.*

Children usually group all mushrooms under the single term, *toadstool*—properly applied only to the unwholesome kind—and shun them all as poisonous. Perhaps this is fortunate, for while many kinds of mushrooms may be eaten with safety and relish, there are others, looking so much like them that only an expert botanist or a very careful observer can tell them apart, which are rank poisons; and between these two extremes are many that cause temporary illness, even though not usually fatal. There is a little poem by Walter Learned that reads:

Five little white-heads peeped out of the mold,
When the dew was damp and the night was cold,
And they crowded their way through the soil with pride:
"Hurrah! we are going to be mushrooms!" they cried.
But the sun came up, and the sun came down,
And the little white-heads were withered and brown:
Long were their faces, their pride had a fall—
They were nothing but toadstools, after all.

How the Mushroom Gets Its Food. Like other fungi (which see), mushrooms lack that green coloring matter called *chlorophyll* which is like a fairy cook to ordinary plants, preparing their food from the soil and air and water, with the sunlight acting as assistant chef. Without this "leaf green," the mushroom lives by appropriating the food which some other member of the vegetable kingdom has manufactured. As a rule it is satisfied to feed upon an old stump or upon decaying twigs; but now and then it will attack the trunk or branches of a living tree, and unless it is removed it is certain to injure the tree's health.

Its Life Story. The history of the common table mushroom will give a good idea of how all the members of the family grow, even though there is some variation in different species. (See picture showing how the mushroom grows.) The tiny button shoving up through the earth is the baby mushroom. It shoots up very quickly—sometimes overnight, when there is plenty of moisture—and the top keeps swelling until there is an umbrella-shaped *cap* and a *stem.* The skin on the underside of the cap splits again and again, forming many thin plates called *gills,* hanging like curtains and radiating from the center. Some mushrooms have a little ragged frill or *ring* around the stem near the top—what is left of the membrane which in the button stage covered the gills like a veil; while the *cup* seen at the bottom of the stem in certain varieties is the membrane that enclosed the young plant and was broken through as the plant pushed itself upward. The table mushroom has no cup, and puffballs never develop even a stem. All over the surface of the gills are tiny dots containing the *spores*—minute, dark-colored grains that perform for the mushroom the same service a seed performs for a flowering plant. When the mushroom is perfectly ripe the spore drops; if it falls into earth that is moist and rich it will swell and burst, dividing and redividing, until by and by there will be formed a network of slender fibers resembling white felt. This woolly mass is called the *spawn*—or, to use the botanical word so often met with in print, the *mycelium.*

The spawn is the real plant, the part that gardeners sell to those who go into the business of raising mushrooms. The part above the ground is only the *fruit,* pushed up by the spawn whenever the soil is wet enough to permit it to reproduce itself, which is done by means of the spore-bearing body.

What Makes "Fairy Rings." Sometimes lawns or meadows are marked by circles of lighter grass, for which the popular name is "fairy rings." It is the feeding habits of the mushrooms that are responsible for these circles, and not the nimble feet of frolicking elves wearing out the grass, as used to be told in tales to children. Because the parent plant so quickly uses up all the proper mushroom food in the spot where it grows, its spores must fall outside the family homestead if they are to develop. Thus, as new mushrooms spring up one by one, they mark out a circle where for a time the grass grows less luxuriantly because so much of the food has been taken out of the soil. After the mushrooms have decayed, however, this circle grows a richer grass than the rest of the lawn on account of the fertilizing effect of their remains.

The Big Mushroom Family. There are about 38,000 known members in the mushroom family, differing almost as much in characteristics as would the same number of representatives of the human family. It is easy to understand, therefore, why it would not be possible to describe or even list all of them in this article. Each one has an elaborate Latin name by which the botanist classifies it in its proper group, but most of them have familiar names, also, which they have acquired through some peculiarity of form or color or habit of growth.

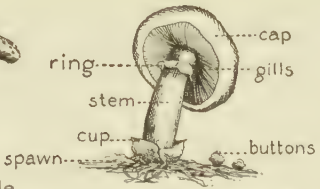
The Edible and Harmless Kinds. Among the thousand or more varieties that are good to eat, the largest class is that of *agarics*—a word that comes from the Latin word for *field,* since all the mushrooms of this kind grow in pastures, lawns, and open, grassy fields. The *common table mushroom* (see illustration) which is the only variety cultivated for the market on a large scale, belongs to this group. In France it is called a *champignon,* from the French word *champs* meaning *field.* It never grows very large, its spores are brown, it has no cup, and its gills are a delicate pink when the plant is young, turning to dark brown as it grows older. These are important points for the mushroom-picker to remember. The wild variety is found most abundantly in the fall or late summer. Other members of this branch are the *oyster mushroom* and the *horse mushroom,* which is similar to the common mushroom, but very much larger and less easily digested. The *parasol mushroom* is taller and is quite graceful, looking like a miniature white or delicate tan umbrella on a slender handle. The edible *amanitopsis* (see illustration) must never be confused with its cousin, the deadly *amanita,* or *death cup,* which has a frill that is lacking in the wholesome mushroom which so closely resembles it.

Among other interesting members of the edible branch of the mushroom family are the delicious *morel,* with its honey-combed cups looking like a cone-shaped sponge, whose favorite birthplace is among leaves or wood-ashes; the dainty, reddish-yellow *chanterelle,* or *little goblet,* so called because of its cuplike form; the branching *coral mushroom,* with its exquisite pink, lavender or amber coloring, most commonly seen in Sweden; the *golden clavaria,* another branching variety the color of honey, which is not only rarely beautiful but most palatable as well. Then there are the familiar *puffballs,* also called *smokeballs* and *devil's snuff-boxes,* tempting one to strike them with a twig and see the tiny puff of "smoke," which means they are scattering their dusty spores to the four winds; the *fairy-ring mushrooms,* which are often dried and preserved for eating and have a flavor like nuts; the *horsetail,* or *shaggy-mane mushrooms,* the *bear's head* and the *hedgehog mushrooms.* The *ink-cap* lives for a long time underground, shoots up overnight in thick clusters, and by the close of the day has dripped away in an inky liquid, as if supplying the tears for its own funeral. Some of the more uncommon kinds are the *jew's-ear,* of which the Chinese are so fond that they import them from the South Sea Islands; the *green russula,* looking like the trumpet of a gray-green morning-glory; the cup-shaped *golden peziza,* lined with orange-red; the *trembling mushroom,* a quivering, jellylike mass; and the *liver fungus,* sometimes called *vegetable beefsteak.*

A very beautiful and interesting mushroom is the *water-measuring earth-star,* one of the puffball group. Its outer covering bursts into a starlike form, leaving the ball in the middle. The points lie flat when the air is damp, but in dry weather they curl up and let the wind roll the plant about, scattering spores as it travels. One injurious variety is the curious *bracket mushroom,* which encircles tree trunks with its miniature shelves painted green or brown.

MUSHROOMS

Parasol mushroom. Edible.



Parts of mushroom.

Common variety, cultivated in caves or cellars.

Death cup. Poisonous.

Oyster mushroom. Edible.

Amanitopsis. Edible.

Delicious morel. Edible.

Fly mushroom. Poisonous.

Inky cap. Edible.

Chanterelle. Edible.

'Water-measuring' earth-star.

Different stages in the life of the table mushroom.

The Poisonous Kinds. The most dreaded of the poisonous mushrooms are two members of the *amanita* group, one called the *death cup,* and the other the *fly amanita.*

The *death cup* grows in the woods from June until fall. Its poison, for which there is no antidote known, acts like that of the rattlesnake, separating the corpuscles of the blood from the serum. The only hope for anyone who has eaten this mushroom is the prompt use of the stomach pump; but there are so few cures that it is small wonder one variety of this innocent-appearing plant has come to be known as the *destroying angel.* Although it is so often mistaken for the common mushroom that comes to our tables, a careful observer could not be misled, for it has white gills, white spores and the fatal "poison cup," whereas the edible plant has pink gills, brown spores, and no cup. Many of the mistakes that are made come from eating it in its button stage, when it is not yet sufficiently developed to show its true character.

The *fly mushroom* "looks good enough to eat" as it flaunts its bright red, yellow or orange cap in the woods or along the roadside. Yet the growing plant is surrounded by dead flies, a few drops of its juice in a saucer make a very powerful fly poison, and taken into the human system it paralyzes the nerves which control the heart action. It is a matter of history that a czar of Russia (Alexis) died from eating this mushroom. Nevertheless, it is not quite so deadly as the *death cup* if the stomach is promptly emptied and injections of atropine given. The earmark of this poisonous mushroom is its combination of scaly cap and stem, deep frill at the top, bulbous base and white spores.

There are other dangerous varieties, like *Satan's mushroom,* the *emetic russula* and the *verdigris mushroom,* all of which are poisonous to some people and not to others. A most offensive mushroom is the *stinkhorn,* sometimes called the *fetid wood witch,* which often grows in backyards or under open stairways, until it is finally located by its sickening odor and promptly uprooted. (See illustration under Fungi.)

Suggestions for Picking Mushrooms. So much experience and knowledge and such a well-trained power of observation are necessary to tell the edible mushrooms from their poisonous relatives, beyond the possibility of a doubt, that the safest rule is never to gather any variety for the table unless some one on whose knowledge you can depend has pointed it out as edible and taught you to recognize its essential characteristics.

The buttons of wild-growing mushrooms must never be picked for eating, for the plant is then too young to show positively to what class it belongs. The market variety, however, is nearly always gathered in the button stage. It is wise to reject all mushrooms which have either a cup or a swelling at the base of the stem, particularly if the gills are white, for this is a fairly-safe indication of danger. As the cup is often hidden under earth, moss or leaves, it is absolutely necessary at all times to dig up the entire plant in order to avoid mistakes.

Mushrooms must be fresh when eaten. No mushroom that shows the least sign of decay, or on which insects have been feeding, should ever be eaten, nor any that have a milky juice, unless the juice is reddish.

The beginner can safely trust himself to pick the coral mushrooms, morels and puffballs, as none of these are on record as harmful, though not all are palatable. Some mushrooms grow to be a foot across, and such a specimen will be enough for several families.

Some people class all highly-colored mushrooms as poisonous, but this is incorrect, as some of the most brilliant are among the most wholesome. Just as unfounded is the popular notion that only the poisonous varieties, when cooking, will make a silver spoon turn black; many edible kinds produce the same effect. There are definite rules for testing mushrooms by careful nibbling and then studying the effects, but such testing cannot safely be indulged in by the amateur.

Mushrooms as Food. From very early times mushrooms have been used as a food. The Greeks and Romans used to eat them, and today they form the chief food of the natives of Tierra del Fuego and some parts of Australia. They are used much more extensively in Europe than in America. In most countries mushrooms are looked upon as a table delicacy rather than a substantial food, for when analyzed they prove to be about eighty-eight per cent water, with almost a half of the remaining bulk indigestible. Experts on food values state that mushrooms are not more nourishing than juicy cabbage leaves would be. There are various ways of preparing them for the table—by baking, frying, broiling, stewing, or as a salad—and most of the edible varieties can now be bought at any season in canned or dried form.

Mushroom culture is an industry that is rapidly growing in popularity, as it pays well, is not difficult to understand, and can be carried on at small expense in cellars, caves or old quarries—almost any place where it is possible to maintain a steady temperature. It is not an unusual thing for boys and girls to help in the work of raising regular crops for the market, and in this way many a college education has been made possible. There are many helpful books published on mushroom culture (see below), and useful handbooks on the subject can be obtained from the United States Department of Agriculture. L.M.B.

Consult Marshall's *The Mushroom Book;* McIlvaine and Macadam's *One Thousand American Fungi;* Farlow's *Edible and Poisonous Mushrooms;* Peck's *Mushrooms and Their Uses;* Taylor's *Students' Handbook of Mushrooms of America;* United States Department of Agriculture Bulletin No. 175, *Mushrooms and Other Common Fungi;* Hard's *Mushrooms, Edible and Otherwise.*

MUSIC. "Music," wrote Carlyle, "is well said to be the speech of angels," and while that cannot pass as a definition, it does serve to emphasize the difference between music and any ordinary succession of sounds. In one sense music consists of any successions or combinations of sounds which are pleasant to the ear. That is, the "song" of a bird is music, and so are the tones of the Aeolian harp which the wind produces as it sweeps over the tightly-stretched strings. But in a stricter sense music is an art—the purest of the fine arts; and careful study is necessary for its mastery and its enjoyment.

Music among the Arts. Only as it avoids telling a story or teaching a lesson can any of the fine arts rightly lay claim to that name. Poetry may be didactic, that is, it may have as its main purpose the pointing of a moral, true and very beautiful, perhaps, but nevertheless a moral; a painting or a statue can tell a story; but music can do neither of these things. And since this is true, since it can but appeal to the sense of beauty and inspire pleasant sensation, it ranks as the purest of the arts.

In another way, too, it differs from all other arts save poetry, for all of these make use of materials which can be handled. The architect's dream is embodied in tier after tier of hewn stone; the sculptor's vision is made a solid thing in marble or bronze; that of the painter is worked out in pigments. But the musician has only tones to deal with. The poet, to be sure, works in words, but even his product differs from that of the composer, for when he has clothed his thoughts in the most beautiful words he can choose his poem can be enjoyed by anyone who is able to appreciate it, without the intervention of any other person. The composer's work, on the other hand, can be enjoyed only as the symbols which he has set down on paper are translated into sounds, for the most thorough musician cannot claim to derive real pleasure from merely gazing at the printed notes of any masterpiece, however perfect. In a way, this is a disadvantage to the composer. When a painter has finished a great picture, when a sculptor has put the last touch to his gleaming marble, he knows that as long as his masterpiece endures it will remain as he left it, interpreting his ideas. But the composer's work may well be distorted, for its performance must of necessity be left to others, and those others may be incapable either of grasping his meaning or of conveying it to others. In another way, however, this difference results in a distinct advantage, for while a statue, a painting, a triumphal arch can be in but one place at a time, a piece of music can be multiplied indefinitely, and can be heard in a hundred places at once.

The Place of Music in Life. "Music," someone has said, "is the fourth need of man: food, clothing, shelter—then music." At first hearing that may seem beyond the truth. "Nonsense," says the intensely practical man, "I have lived fifty years, have built up a fortune, and I don't suppose I've given six hours to music in all my

life." But his attitude proves nothing. He has got along without music, but that is no evidence that he has not needed it, that his life would not have been far richer and better if its influence had been admitted.

> The man that hath no music in himself,
> Nor is not moved with concord of sweet sounds,
> Is fit for treason, stratagems and spoils,

wrote Shakespeare; and while it must be admitted that he exaggerated, and that many an excellent person has no love for music, it is nevertheless true that music should have a very real part in every life. The greater part of the time of most people is given up necessarily to material things—to the struggle for a comfortable livelihood, perhaps even to a grinding fight against poverty; and those elements are sadly needed which can inspire, which can lift the mind above sordid things and make clear the possibility of a larger life. And this inspiration, this pleasure, freed from all taint of worldliness, nothing can give more perfectly than good music. Addison wrote of music that

> It wakes the soul, and lifts it high,
> And wings it with sublime desires,
> And fits it to bespeak the Deity.

More than once in the history of the world music has been an important factor in some great movement. What the *Marseillaise* has meant to France everyone knows—how it has been necessary at times to forbid its use because it fired to such fury and bitterness the legions who sang it. The Greeks had a beautiful story, half legendary, perhaps, but worthy to be true, which well illustrates this point. At one time in the very early days of Greece, the Spartans, hard pressed by their enemies, sent to Athens seeking aid, but the Athenians were too jealous to grant their plea. Fearing to refuse outright, however, they resorted to a subterfuge; they sent as their representative the poet Tyrtaeus, a man of song and not of action, thinking that he could give no possible assistance. But how great was their error! For Tyrtaeus composed ringing martial songs, and under the inspiration of these the Spartans renewed their courage and gained a glorious victory.

The Study of Music. There is a word which has been misused and overworked until it has come to be held in contempt—the word *culture;* and yet that for which it stands, if genuine and not self-conscious, is by all means to be sought. And no one can hope to have a true culture and a broad education without a knowledge of music. At once, when such a statement is made, two objections arise. In the first place, some critic will say it is necessary only to *enjoy* music, not to be able to *produce* it; and anyone with ears can do that. But this is not really true. It is true, of course, that almost everyone receives some pleasurable sensation from listening to music, but only the trained hearer can feel a true appreciation and derive the maximum of pleasure. The person who has absolutely no musical knowledge can no more hear all that there is to be heard in a great musical composition than the child who has read no further than "I see the cat" in the primer can appreciate Shelley's *Ode to a Skylark.* Such a child may, if he has an inborn sense of rhythm, feel just a hint of the charm of flowing lines, but that is very different from an understanding of the poem.

The second objection is that everyone cannot become a musician. This is true, if by musician is meant a singer, a performer upon some instrument, or a composer; and for too long music was held to be just an elegant accomplishment, reserved for those who had a special bent for it. But times have changed, and some musical training has been made a part of general education; it has come to be understood that everyone can be at least an intelligent listener, if not a performer. As well say that, because a child will probably never write poetry, or give public readings, it is not necessary for him to be acquainted with any poetry, as to declare that the person who is not to become a professional musician need not be taught music.

There is more than one type of musical training. There is drill in the rudiments of the science, in the terminology, the notation, the actual production of tones; for it is a fact which admits of no contradiction that everyone, whether he ever makes practical use of his knowledge or not, can learn to "read music" readily. Then there is that more theoretical study which concerns itself with the hearing of music rather than with the production; for it cannot be too often stated that listening to music requires a special training. When one looks at a statue or reads a poem, the composition remains fixed before the eye. Attention may be directed first to one part, then to another, and then in the end the whole may be subjected to a long examination. But in music conditions are otherwise. Everything is fluid. A certain melodious strain, an exquisite chord,

has passed almost before the ear has caught it, and the performer cannot well be stopped and asked to repeat it. It is necessary, therefore, that the musical memory be trained, so that one part may be retained in the mind until what follows has been welded to it, and the perfect form is grasped. Some knowledge of various musical forms is necessary, too, that the hearer may know what to expect when listening to a certain composition. In this latter phase of study these volumes will be of assistance, for they discuss without technical difficulties the musical forms—the sonata, the fugue, the concerto, the symphony, and others; while as for the actual drill in rudiments, there is given below a complete, if brief, course of study. Before this is taken up, however, some knowledge of the history of music is most desirable, as without that its purposes and its achievements cannot be understood.

The Story of Music

In the Long Ago. Practically every tribe, no matter how primitive, has its music of one form or another, though to civilized ears it may sound very unmusical; and in the far-away ages of the world every nation produced music of some kind. But there were very decided differences between even the best of this ancient music and what modern people know as music. In the first place, the ancients had no harmony; they knew nothing of the exquisite effect to be gained by sounding together two or more notes that "chord," and produced only melodies or "tunes" of the very simplest sort. Then, too, they knew nothing about key—not even the facts which the youngest beginner learns to-day.

Little is known of the music of the Egyptians, beyond the fact that on their rude sculptures various instruments are shown, but it is of importance because from it the music of the Greeks was derived; and the Greeks, masters of beauty in almost every stage, made decided advances in music. To them, however, it was not really an art in itself, but a means of heightening the effect of poetry. When a poet had produced a number of beautiful lyrics or perhaps such a wonderful epic as the *Iliad,* he could not have them published as can a modern writer, but with his lyre or cithara he appeared before some great assemblage and chanted his sounding lines; and if his hearers were pleased with him he was crowned with a wreath of laurel. Many were the legends which the Greeks wove about music, and the very name is taken from that of the Muses, the goddesses who presided over its mysteries. Apollo was the god of music, and the lyre was sacred to him; any presumptuous mortal who dared to challenge his powers was most severely punished (see Apollo).

The Romans borrowed their music from the Greeks, but found it not warlike enough to suit their martial spirits. They introduced the trumpet and the tuba, and the all-conquering legions responded to the different notes of the trumpet as does the modern army to the bugle calls. It is also said that the first organ, a crude affair, was invented by the Romans.

Sacred Music. Meantime, far to the East, across the sea from Greece and Rome, had grown up music of a different sort. This consisted of the sacred songs of the Hebrews, of which the words, but no hint of the music, came down to later times as the *Psalms.* When Christianity spread to the Roman Empire and became in time the accepted religion, the old psalms were used, and new songs and chants were introduced. Indeed, for several centuries the art of music was preserved by the Church alone. Nobody can tell to-day what sort of "tunes" these early Christians used for their songs, but they probably had little connection with the old Roman and Greek music. In the sixth century there lived a pope, Gregory the Great, who did much to advance music, writing hymns, and above all else producing the Gregorian chant which is to this day used in the Roman Catholic Church.

Still there was no such thing as harmony, the chants all being sung in unison; nor had the staff or a satisfactory system of notation been invented. And until these fundamentals had been agreed upon there could be no real progress. The seventh, eighth and ninth centuries passed with little change, but at the close of the ninth century a monk of Flanders wrote a treatise in which he set forth many of the principles of harmony, and about a century later the staff, almost as it exists to-day, was invented.

Folk Songs. The solemn chants did not completely satisfy that love for music which seems inborn in human nature, and in every country folk songs grew up. The Celts made decided progress in such music, and their bards, who sang or chanted to their rude, stringed instru-

ments ballads of their own composition, occupied an enviable social position. Later came the minstrels and the troubadours, with their ballads and their love songs, into which there crept during the time of the Crusades new musical forms brought from the Orient.

To-day the complaint is sometimes heard that sacred music has been lowered by a too close similarity to the undignified popular music of the time, but this is not the first age in which the Church has accepted suggestions from secular music. Far back in medieval times a writer of a mass would frequently take as his theme the air of some popular song, and references are found to masses which bear the far-from-sacred titles of *The Red Noses, The Armed Man,* or *Farewell, My Lover.*

Growth toward Modernism. In the fourteenth and fifteenth centuries the Dutch were the foremost musicians of Europe, paying especial attention to counterpoint—the arrangement of one or several independent parts, or voices, in harmony with a given melody. It was a Dutchman who made popular the madrigal, that during the sixteenth and early seventeenth centuries swept over Europe. The madrigal was a love-lyric written for from three to eight voices, in counterpoint, and usually unaccompanied. Every composer wrote madrigals, every singer sang them; and it is said that sight reading was a more widespread accomplishment among the educated than it is to-day, for a great invention had made possible the spread of published music—the application of movable type to music-printing.

Meanwhile Italy had produced the first great musical genius—the "father of modern music," Palestrina. It is almost impossible to overestimate his influence on the progress of the art, so thorough was his knowledge of all its principles, so elevated were his compositions. Even he, however, knew nothing of our very common phase of modern music—the writing of accompaniments, properly so called. To be sure, there were musical instruments in plenty, the organ, the clavichord, the spinet, the violin, the flute and the guitar; but when these were used with the voice they played just the notes which were sung—not an independent accompaniment.

The first opera which has a real claim to that title, though it by no means meets all the demands of modern opera composition, was written by Peri, and was produced at Florence in 1600. The same year saw the first oratorio, and both types of composition made steady and rapid advance. Indeed, by the eighteenth century most of the essential elements were present, and music bade fair to become the very popular art it has been since that time. The principles of harmony were well understood, and "part" music had been freed from the harshness which distinguished its earlier phases; a satisfactory notation had been universally accepted; instruments were plenty and were gradually being brought to greater perfection; and, best of all, the popular imagination had been touched and a boundless enthusiasm created.

The Modern Period. Since the eighteenth century each country of note has had its own musical history, differing as distinctly as has the political history. And yet no country could have progressed as it has done if it had failed to take advantage of the advance made in other countries. Throughout much of the modern period Germany has maintained a supremacy in the musical world, and a list of its great composers constitutes a veritable history of music. What, for instance, would the story of music be without the names of Bach, Handel, Haydn, Gluck or Mozart; without that supreme master, Beethoven; or, in the later period, without Schumann, Schubert, Mendelssohn, Liszt, Wagner and Brahms? In every field of musical endeavor German composers left their mark, instrumental music of every sort, song, opera, oratorio, all being enriched by them. Strength, dignity, emotional depth—these are the chief characteristics of the German school.

Italy's chief contributions have been to opera, and sweetness and beauty of melody have been the aim of most of its composers. Some of the most exquisite and well-known melodies in the world are from the operas of Rossini, Donizetti, Bellini, Verdi and Mascagni. Of more modern Italian composers the best known are perhaps Puccini and Wolf-Ferrari. France, too, found its chief musical joy in the opera, and the names of Cherubini, Auber, Halevy, Gounod, Bizet, Massenet and Saint-Saëns stand high in the list of composers. These are the three chief musical countries, but that does not mean that other nations have made no important contributions to the art. England, while it has produced nothing of note in the field of grand opera, has excellent dramatic music of a lighter character, as the names of Balfe, Barnett, Macfarren and Sullivan testify; while eminent composers in other fields have been Bennett, Barnby, Stainer,

Coleridge-Taylor and Elgar. Poland has produced the great Chopin; Russia, Tschaikowsky, Rubinstein and Rachmaninov; Bohemia, Smetana and Dvorak; and Scandinavia, Gade, Grieg and Sinding.

North America had until comparatively recent times no independent musical history, and the work of its early composers, among whom John Howard Paine is perhaps best known, showed no originality. Later attempts were made to develop in the United States a national music by making use of negro folk songs or Indian chants as basic themes, but it cannot be said that the resultant music is characteristically American, for neither the negroes nor the Indians are typical of American life to-day. Chadwick, Nevin, Foote, Shelley, Cadman, Parker—these are some of the most important names in the history of music in America; but the name which far outshines them all is that of MacDowell, a composer of world fame, who died before he came to the zenith of his powers.

For a detailed account of the contributions which all of these composers in the various countries have made to music, see the articles on their names.

The most recent tendency in music, as in painting, has been toward impressionism, and the adoption of this tendency by composers everywhere has done much to obliterate national lines in music.

A Course of Lessons

The lessons which follow will not teach anyone to play the piano or to sing, but they are of such a general, basic character that they will form an excellent foundation for any other lessons. They intend to make clear the terminology and notation of music, and some of the simpler facts about musical theory; indeed, they cover just about the ground covered in a public school course in music, save that they make less provision for practice. Practice is necessary, however, and skill in recognizing the various symbols can be gained only from frequent sight of them. Any music book, even if it be but a hymn book, will furnish ample illustrative material to supplement the discussion here. For instance, when the various kinds of notes are treated, as whole notes, half notes, eighths and sixteenths, an excellent drill may be had by picking out each of these many times in some singing book.

Common Musical Terms. As music is the art or science of tones, it is necessary first of all to understand clearly what a tone is. All sounds are caused by the vibration of some body, and when this body is of a certain character and the vibrations are even and rapid enough to blend together into a pleasing and musical sound, this sound is known as a *tone.*

Experiment. Stretch a strong string or a fine wire between two nails about three feet apart, letting it remain rather slack. When it is plucked does a musical sound result? Draw it tighter and tighter, touching it occasionally. Can you notice just the moment when the sound loses its unmusical character and becomes a real tone?

Scientists have found out that if a sounding body makes fewer than sixteen, or more than 8,192 vibrations in a second, the human ear is incapable of receiving the result as a musical sound.

The musical sounds called tones differ from each other in four respects—in intensity, or loudness; in quality, or timbre; in pitch, and in length, or duration; and an understanding of these terms is necessary.

Intensity or loudness is a simple matter. Touch your tightly-stretched wire so that its vibrations are but small. Now pluck it hard, so that it may vibrate through a wide arc. Which operation produces the louder tone? This will show you that intensity, or loudness, has to do, not with the length of the vibrating body, but with the size of the vibrations, wide vibrations giving the louder tone. Now, no matter what the instrument used, whether it be the piano, the flute or the delicate voice of a child, loudness can be merely a relative matter, and composers and performers have agreed upon a number of terms which shall be used to indicate varying degrees of intensity. The following list gives the most common of these, with the ordinary abbreviation and the meaning of each. They are all Italian words, as are, in fact, most musical terms, and there is a certain justice in this, not only because modern music owed much of its early development to Italy, but because Italian is the most musical of tongues:

Fortissimo (ff.) .....very loud
Forte (f.) .....loud
Mezzo (m.) .....medium
Piano (p.) .....soft
Pianissimo (pp.) .....very soft
Mezzo Forte (mf.).....medium loud
Mezzo Piano (mp.).....medium soft

Crescendo (cres.) or < gradually becoming louder
Decrescendo (decres.) or > gradually becoming softer
Diminuendo (dim.)
Sforzando (sf.) .....suddenly loud

Quality, or *timbre,* is a very broad term, but its distinctions are very easily recognized. Anyone, for instance, hearing four sounds made by a piano, an organ, a violin and the human voice, could tell the difference immediately—that is, could distinguish the various timbres; for quality or timbre depends upon the kind of vibrating substance which gives forth the sound.

Pitch is a very important matter, and concerns the highness or lowness of a tone. Turning once more to the stretched wire, pluck it and listen carefully to the tone produced. Now drive a staple into the wooden background so that it crosses the wire about in the center, and rests upon it. Vibrate either half of the string. Is the resultant tone the same as that given out by the whole string? Is it higher or lower?

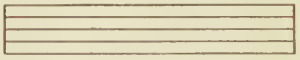
If your division of the string marks the exact center, the tone given out by the half will be in unison with that produced by the whole, but will be higher in pitch. The relations which govern the length of sounding bodies and the consequent differences in pitch have been worked out carefully, and it has been discovered that bisecting the vibrating string or air column doubles the number of vibrations produced, and raises the pitch exactly an *octave.* That is, if that fundamental tone known as middle C has 256 vibrations to the second, the C above will have 512, and that below 128. This entire question of pitch of octaves and the tones in between, is taken up in a later lesson on *Scale.*

Duration refers to the length of time a certain tone is sounded. The wire referred to may be struck and then touched instantly so that the tone ceases abruptly, or it may be allowed to vibrate until the tone dies out. In either case the tone is the same, but the duration is different. In the latter instance the intensity changes, too, as the vibrations become less and less wide; but there is and can be no variation in pitch.

One of the important points to remember from this early study is that a vibrating body of a given length can produce only one tone. Intensity may vary, duration may vary, but the pitch cannot change.

The subject of duration is discussed in a later lesson, under the heading *Time.*

A Lesson on the Staff. All that has gone before concerns itself practically with the theory of music, but the student comes very early in his study to certain definite symbols, for music has a notation all its own. First of all, he must learn about the *staff.* This consists of five horizontal lines, equidistant from each other, and looks like this:



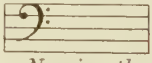
On it are written characters called *notes,* which represent the tones, and a tone is higher or lower according as its representative note is higher or lower on the staff.

Added Lines. Each line and each space of the staff is called a *degree,* but there are not enough of these degrees to allow for the placing of all the notes used in music, and it is frequently necessary to add, above and below the staff, short lines called *added* lines, or *leger* lines. These lines, of course, provide extra spaces as well, and these are spoken of as the *first space below,* the *second space above,* and so on, while the lines are referred to as the *first added line above,* and so on.

The Clefs. Now it is clear that it would be possible with the use of just one staff to place all the notes ever used, merely by adding an indefinite number of lines above and below; but this would be very confusing, as the added lines are not always easy to recognize. Therefore composers make use of two staffs, a treble staff and a bass staff, the latter indicating the lower notes. To distinguish between these two staffs, symbols known as *clefs* are used, and only as it is marked with one of these can a staff really indicate pitch.

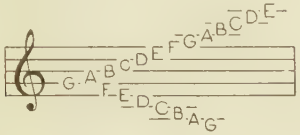
The *treble clef* is also known as the *G* clef, for in its form it is derived from a capital G. It is placed at the left-hand end of a staff, as here pictured, and by the fact that its end curls around the second line, it indicates that it is the treble clef, for *G* comes on that line.

The *bass* clef, or *F* clef, is made as shown, and by the fact that its head is on the fourth line, it shows that in the bass clef *F* is on the fourth line.



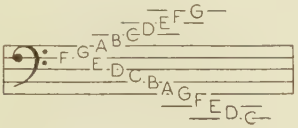
Naming the Staff Degrees. As stated above, two tones whose number of variations to the second stand in the ratio of one to two are an octave apart in pitch. In between these there are six other tones which, sounded one after

the other, seem to the modern ear to make up a more agreeable succession of sounds than any other, and these six, with the two "end" tones, make up the octave, for octave means *eight*. Each of the tones in this series of eight is given a name to indicate its pitch, these names being the first seven letters of the alphabet; for tones just an octave apart bear the same name. The staff on which notes must be written if they are to show pitch has its lines and spaces named according to the note for which it stands. The degrees of the treble staff, then, with the added lines and spaces most commonly used, are lettered as follows:



Whenever a treble staff is seen, the notes on it indicate just these tones and no others, unless there is placed at the left end of the staff or before any one note one of the symbols called *sharps* or *flats* (see below).

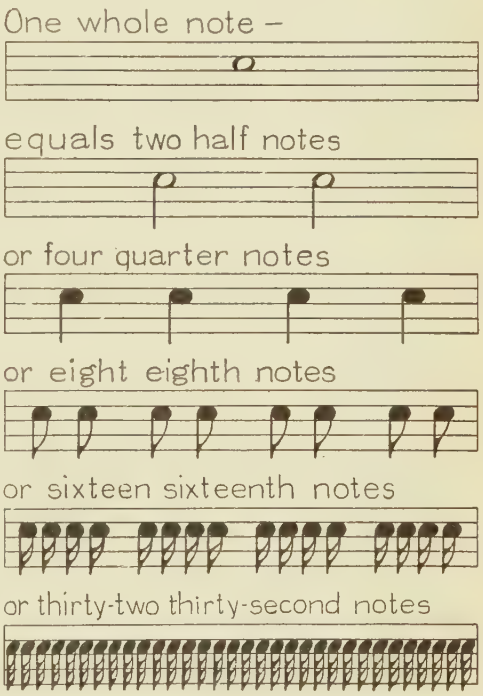
In the bass clef the degrees indicate the following letters or notes:



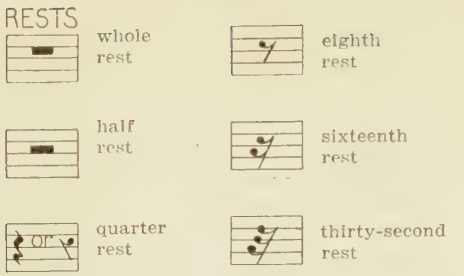
The added lines above on the bass clef and the added lines below on the treble overlap, that is, the first added line above the bass and the first added line below the treble both indicate middle *C*. This duplication, however, is not unnecessary, for it furnishes a method of showing clearly whether it is the left hand or the right hand which is to play the notes on the piano, and whether the basses and tenors or the sopranos and altos are to sing certain notes on the staff.

Instant recognition of every note on the staff is necessary before any headway can be made in the study of music, and such recognition can never come from reading about the notes. Only continued examination of the staff itself, and much practice in locating the notes on it, can make such foundation knowledge absolutely sure. First study carefully the treble staff and the bass staff given above. Then draw the two and place upon them the letters or names, taking care not to use the easy method of placing them in order as they come. Write the letter of the fourth space of the treble clef; the fourth line of the bass; the fifth line of the treble; the second line of the bass. Write *C* above the treble clef; *A* below; *E* above the bass clef; *A* on that clef. Continue this until all the lines and spaces are named, and repeat the exercise until you can fill in the letters as easily as you can write the alphabet or count from one to ten.

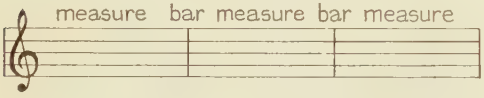
A Lesson on Notes and Rests. We have spoken of notes as indicating *pitch* by their position on the staff; but pitch is not all they can show. By their *form* they indicate the duration of the tone—the length of time it is to be continued. The standard is the *whole* note, and upon the time allowed for this depends the length of all the other notes. The following table will show the forms of the various notes, the names, and the part of a whole note to which each is equal:



Rests. Since time is such an important feature in music, the periods of silence must be as exactly timed as is the duration of notes, and thus there are necessary symbols called *rests* which indicate silence. Each kind of note has a rest corresponding to it, and the various rests have the same relation to the whole rest as do the various notes to the whole note. The table on the next page indicates the forms and names of the rests.



Measures and Time. Just as a poem is divided into lines of certain length, not that it may "look well on a page" but that the rhythm or meter in the mind of the poet may be apparent, so every musical composition is divided into equal portions of time, called *measures.* Nowadays poets frequently disdain the old division into rhythmic lines, and compose what they call "free verse," which has no regular metrical scheme, but no musician ever tries to write music without separating it into measures of equal length. When music is *heard,* it is the rhythm or accent which shows where the divisions come; when music is *written,* the measures are separated by vertical lines called *bars,* thus:



And just as a line of poetry is divided into *feet,* so a measure in music is divided again into equal portions of time called *beats.* A measure may have two beats, six beats, four beats, three beats, but unless there is some indication to the contrary, one measure must not have two beats and the next three or four. On looking at a piece of music it is not necessary to count the number of beats to a measure, for the composer has clearly indicated this. To the right of the clef sign at the beginning of the composition appears a fraction which is known as the *meter signature.* The numerator of the fraction tells how many beats there are to each measure; the denominator, what kind of a note is to receive one beat. Suppose, for instance, that the signature is ¼, the so-called "common time" signature. It shows instantly that a measure contains the value of four quarter notes; or, in other words, that there are four beats to a measure, and that each beat belongs to a quarter note. The signature ⅝ indicates that an eighth note is the standard and receives one beat, while there are six such notes to a measure. Half notes, quarter notes and eighth notes are the ones most frequently used as standards, and the signatures most commonly used are ½, ²⁄₄, ¾, ¼, ⅜ and ⅝.

Musical Accent. If every note in a measure received just the same stress, there would be no reason for dividing a composition into measures at all, but music has its accent just as do words. In each measure the first beat, the note just after the dividing bar, is accented, and the different meters correspond to certain meters in poetry. A ½ or a ²⁄₄ meter, for instance, is like the trochee in poetry (which see), which consists of a strong syllable followed by a weak, while the ⅜, ¾ and ⅜ measures are like the dactyl, with its "strong, weak, weak" movement.

In pronouncing a long word it is frequently necessary to use more than one accent, the "secondary" accent, as it is called, being not so heavy as the regular one; and music shows the same tendency. If a measure has two or three beats it has but one accent, as *"one,* two, *one,* two" or *"one,* two, three, *one,* two, three;" but in measures with four or six beats there is a secondary, weaker accent which falls on the beat immediately after the center, thus ONE, two, *three,* four" or "ONE, two, three, *four,* five, six." In case there are nine or twelve beats to a measure—for ⅝ and ¹²⁄₈ time are not unknown—the first note in each group of three is stressed, but the main accent always falls on the first beat. For "ragtime," or syncopation, see subhead, page 4025.

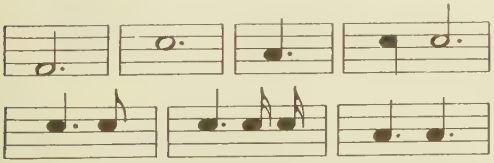
Divided Beats and Broken Measures. It must not be imagined that just because a meter signature indicates that a certain note is the standard, only that kind of a note can be used in the composition. If the signature is ¾, for instance, it is not necessary that quarter notes shall predominate. There may be half notes, which have the value of two quarter notes; there may be eighth notes, of which it takes two to equal a quarter note, or there may be sixteenth or thirty-second notes, but of course there cannot be a whole note, for that is equal to *four* quarters, and a ¾ measure does not contain so many. It must be borne in mind that every measure must be complete —must contain just exactly the time value indicated in the signature. In the ¾ meter a measure may contain a half note and a quarter or two quarter and two eighths, but not a half note and an eighth note. Figure out for yourself and mark down on a staff as many different note combinations as possible for a ¾ measure; for a ¼; for a ⅝.

Sometimes there is introduced for variety what is known as a *triplet.* This, as its name indicates, is a group of three notes, but when they are played they have the value of only two notes of the same sort. Two eighth notes, for instance, are played or sung in the time of one quarter note, but these two eighths may be replaced by three, tied together as a triplet. The commonest way of writing a triplet of eighth notes is to join the stems, thus: , but a triplet of quarter notes is usually written thus: . A triplet is generally played rapidly and lightly, as though the word "hap-pi-ly" were spoken upon the beat when it occurs.

Perhaps someone may say, "But there *are* incomplete measures. I've seen pieces in ¼ time whose first measure had but one quarter note." Turn to the end of the composition, however, and it will be evident that the difference is made up there. In a ¼ meter, if the first measure has one beat, the last will have three.

The Important Dot. Suppose in writing a composition in ¾ time the composer wishes to have one note held for a whole measure. How will he indicate that fact? He cannot simply write three quarter notes or one half note and two eighths, for each of these would have to be sounded separately. There are, however, two ways of showing exactly what he wants; he may either use the *tie* (see next subhead below) or the *dot.* The rule governing the dot is very simple: *a dot placed after any note adds one-half to its value.* A quarter note, for example, is equal to two eighths, and a dotted quarter is thus equal to three eighths, while a dotted half note equals three quarter notes. Bearing this in mind, can you add to the methods figured out above for writing a ¾ measure?

Look carefully at the following and tell what meter signature in each case would have to be written in the measure:



Ties and Slurs. If two notes are written thus, , each one is sounded distinctly, but if they are connected with a curved line, thus, , only the first is sounded, but the time given it is equal to that of the two combined. That is, two quarter notes so connected would have the time value of a half note; a quarter note and an eighth note, the value of three eighth notes. Such a curved line is called a *tie,* and naturally it can be used only to connect notes on the same degree of the staff. Sometimes, however, an exactly similar line, as , is used to connect notes on different degrees; this is called a *slur.* In instrumental music it tells the player to slip from one note to the other as smoothly as possible; in vocal music it shows that the notes joined are to be sung to the same syllable of the word.

What Is "Ragtime"? The regular rule for the accenting of measures is given above—the strong accent on the first beat. But sometimes, to give an unusual effect, the composer chooses to shift this accent to a beat that would commonly be unstressed. He therefore ties the first note in a measure to the last of the measure before, or ties the third beat in a ¼ measure to the second, thus throwing the accent to the second or fourth beat. There are other ways of securing similar effects, but these are simple and illustrate the principle well. The musical name for such a shifting of accent is *syncopation,* and composers have always been disinclined to use it, while music students have considered it one of the subjects very difficult of mastery.

But of recent years there has been a real rage for syncopated music. Composers have flooded the market with it; people have learned to play it when they could not play anything else, and occasionally teachers have set themselves up as teachers of that only. It is not, however, commonly called syncopated music, but *ragtime;* for ragtime is nothing more nor less than music of fantastic meter, with its accents on other than the regular beats. Many critics and musicians deplore its wide spread, feeling that it is certain to result in a lowering of musical taste, but others believe that in time it will develop beyond its extreme state into a type of music that is really worth while.

Tempo. This word, which means *time,* is used to indicate the rate of speed to be used in singing or playing any composition. The absolute time can be given only by the metronome (which see), but the composer may use a number of terms which serve to show about how

slowly or rapidly he wishes his compositions performed. The commonest of these terms are the following; like the terms indicating intensity, they are all Italian:

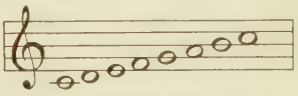
Adagio .....very slowly
Allegretto .....cheerfully
Allegro .....rapidly and brightly
Andante .....slowly and smoothly
Andantino .....somewhat slower than *Andante*
A tempo .....at the original speed
Larghetto .....slowly
Largo .....slowly and solemnly
Lento .....slowly
Moderato.....with moderation
Poco a poco....little by little, used in connection with some term meaning *more slowly* or *more rapidly*
Rallentando ...decreasing in speed and force
Retard .....slower and slower

A Lesson on the Major Scale. As stated above, there are in an octave eight tones, which make up a series more simple and pleasing to the ear than any other. This series is known as the *major scale,* and any beginning pupil, whether he be studying vocal or instrumental music, must devote considerable time to its complete mastery. First of all, it is necessary to realize that the major scale does not make use of *all* the tones between the extremes of the octave. Sometimes there is between two successive tones the interval of a half-step—the smallest interval in the scale; sometimes there is a whole step. In detail, the series is as follows:

Between one and two of the scale there is a step; between two and three a step; between three and four a half-step; between four and five a step; between five and six a step; between six and seven a step; and between seven and eight a half-step.

Thus to a certain extent the major scale is a fixed quantity, since it must always have the same order of steps and half-steps; but in another way it is not fixed, for it may begin anywhere within the range of tones. Sound any tone, and then one considerably lower. From either of these, or from any tone in between, the scale may start, but once its starting note is decided upon the series is exactly the same. This starting note has a special name. It is the *keynote,* or *key tone,* and it is well named, for all the scale depends upon it. Before writing any composition the composer decides on the tone with which he wishes his scale to begin, and indicates it on the staff, as will be shown below. Suppose he decides that *C* is to be his starting tone—then his composition is written in the *key of C.*

The So-called "Natural" Key. Choose some song that you know, and sing the first line of it. Then choose a new starting tone, somewhat lower, and sing the same line. You have sung the line in two different keys, and provided both were within the range of your voice, one was as easy as the other. But in learning to *read* music, whether vocal or instrumental, there is one key with which it is easier to begin than with any other, and that is the key of *C.* The pupil has learned to recognize the staff, the meaning of a bar, the letter-names of the different notes, the time value of the different kinds of notes, the clef signs and the time signature; and the key of *C* is the only key in which he can begin to read without having to learn other symbols at once. Moreover, in playing on the piano, this key is the only one which can be played without the use of the black keys. The key of *C,* or, as it is sometimes called, the scale *from C,* is written on the staff as follows:



Now refer back to the step-and-half-step description of the scale, and it will be evident that there must be a step between *C* and *D,* a step between *D* and *E,* a half-step between *E* and *F,* a step between *F* and *G,* between *G* and *A,* between *A* and *B,* and a half-step between *B* and *C.* If you will look at the piano and count upward from *C* you will find that the half-steps come where two white keys are together; the whole steps where there is a black key between.

The scale from *C* shows clearly one fact of general importance. Looking at the staff pictured above, name all the tones in the scale. Are there any of the seven letters used in naming the scale absent? In any other scale the same thing is true, only, of course, the start is made with a different note. Name in order the tones which make up the scale from *D;* the scale from *G.*

There is another common method of naming the tones of the scale—a method which is used for vocal music only. Each tone has a syllable, as follows:

One Two Three Four Five Six Seven Eight
do re mi fa sol la ti do

But it must be kept clearly in mind that these syllable names are related to the *tones,* in their numerical order, but not to the letter names. That is, the first tone in the scale is always *do,*

just as it is always *one,* while the letter name varies according to the keynote of the scale. Thus in the key of *C, C* is *do;* in the key of *B, B* is *do,* and so on.

Working Out Other Scales. If the student approaches the subject with the right mental attitude, there is no topic in music more interesting than that of the changing scales. Sharps and flats then appear, not as vexatious signs invented to puzzle the learner, but as ingenious devices to do away with difficulties. The matter may be approached somewhat as follows:

Remembering that each scale must contain *all* the letter names, write the scale from *F,* and indicate underneath the interval between the successive tones, as made clear in the paragraph on the "natural" key.

1	2	3	4	5	6	7	8
F	*G*	*A*	*B*	*C*	*D*	*E*	*F*
step	step	step	half-step	step	step	half-step	

Now compare this with the order of steps and half-steps necessary for the making of a perfect scale. It is found there that the half-steps must come between three and four, and between seven and eight. So far as the latter is concerned, this scale from *F* is all right, for the interval between *E* and *F* is but a half-step. But the other half-step comes between four and five, instead of between three and four, as it should. What is to be done? There is no extra letter which can be used, but there is a handy little symbol which just answers the purpose. It is made thus, ♭, and is called a *flat,* and it shows that a tone one-half step lower than that indicated by the letter to which it is joined should be used. This flat, then, is placed in front of the *B,* and the interval between three and four is diminished to a half-step, while at the same time that between four and five is increased to a whole step. The scale from *F,* then, to be complete, should be written as follows:

F G A ♭*B C D E F*

Another scale which can be worked out without much modification is that from *G:*

G	*A*	*B*	*C*	*D*	*E*	*F*	*G*
step	step	half-step	step	step	half-step	step	

Here the first five intervals are correct, a half-step occurring between the third and fourth, but the other half-step appears between six and seven, instead of between seven and eight, as it should. The problem, then, is to lengthen the interval between six and seven and to lessen that between seven and eight, and that can be done in just one way—by substituting for *F* a tone one-half step higher. This new tone is called *F sharp,* and written ♯*F.* The scale from G, then runs

G A B C D E ♯*F G*

These two little characters, ♯ and ♭, serve to make all the changes that are necessary in working out all the possible scales, but whereas in the scales just discussed each one is used but once, in some scales there are several.

Interesting Problems. A scale may be written as stated above, beginning with any tone, and the beginner will find it interesting to work out other scales. He will thus convince himself that there is nothing more difficult about the scales with several sharps and flats than there is about the scale from *C.* Take, for example, the key of *A,* and write out the letters as follows:

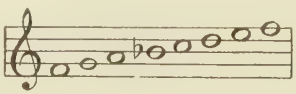
A	*B*	*C*	*D*	*E*	*F*	*G*	*A*
step	half-step	step	step	half-step	step	step	

It is evident at once that the intervals between two and three and between five and six must be lengthened, while those between three and four and between seven and eight must be shortened. By adding sharps to the *C,* the *G* and the *F,* this is accomplished, the resulting scale reading as follows:

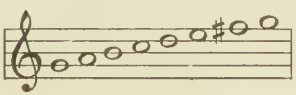
A	*B*	♯*C*	*D*	*E*	♯*F*	♯*G*	*A*
step	step	half-step	step	step	step	half-step	

Work out the scale from *E;* from *D;* from *B;* from ♭*E;* from ♭*B.*

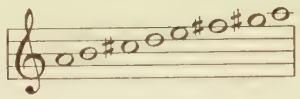
When the principles of this are fully grasped, try writing out the various scales on the staff, placing the sharps or flats before the notes whenever necessary. The key of *F,* for instance, would be as follows:



the key of G would be written thus:



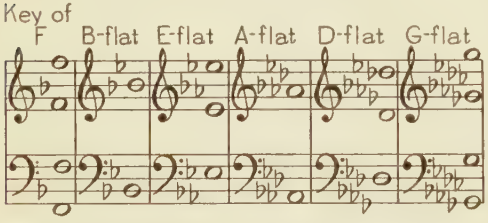
and the key of *A*,



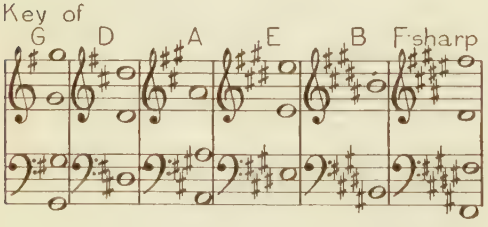
How to Remember Scales. Of course it would be possible in writing out a musical composition to place a sharp or a flat before each note when one was necessary, but this would be troublesome and would make the music look unnecessarily difficult. A much simpler method, therefore, is in use. All the sharps or flats needed for the scale in which a composition is written are placed at the left end of the staff, just after the clef sign, and every note which appears on one of these sharped or flatted degrees is affected throughout the composition unless otherwise marked.

The term *key signature* is the name applied to this group of key-marking sharps or flats; and every composition bears a signature, unless it is in the key of *C*.

Here are the key signatures for the scales which make use of flats. Both the bass and treble clefs are given, as the eye must learn to recognize one as rapidly as the other.



The sharp signatures run thus:



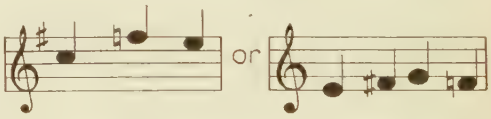
Is there any way to recognize a key from its key signature? is a question the beginner will want to know. It is easy enough to say, "This is written in the key of four flats," but what is the keynote, or *do?* Look in the flat signatures at the flat farthest to the right in each case, and count down four degrees on the staff, including the degree marked by the flat. Is the result not in every case the keynote, as shown above? That is, the flat farthest to the right always comes on *fa* of the scale, and it is merely necessary to count down, *fa, mi, re, do,* to find the keynote. In all except the key of one flat there is another method of recognition. The next to the last flat always marks the keynote.

To tell the keynote in a scale using sharps is even simpler, for the sharp farthest to the right is always just one degree below the keynote. In other words, this last sharp marks *ti* of the scale, and counting up one tone gives *do*.

In the formation of scales, flats are added in the order *B, E, A, D, G, C,* and sharps in the order *F, C, G, D, A, E*.

Accidentals. Sometimes the composer wishes to indicate that a note within the composition which was not indicated in the key signature is to be sharped or flatted, and he places a ♯ or a ♭ on the required degree of the staff. When the character is introduced in this way, it is called an *accidental,* and affects the note only through the measure in which it occurs.

There is another accidental which is made thus, ♮, and is called a *natural.* It cancels the effect of a sharp or flat, whether this has been used in the key signature or merely as an accidental. This will indicate its use:



A Lesson on Transposition. This may at first sound difficult, but there are certain facts about the subject of transposition which any pupil will find interesting. Transposition means the shifting from one key to another, and it is accomplished in a delightfully simple and orderly manner. Write out the letter names of the tones in the scale from C, thus:

C D E F G A B C

and to find the key of one sharp, take the fifth tone in the scale, or *G,* as the starting point. Writing out the formula,

G A B C D E F G

it becomes clear that *F,* or the seventh of the scale, must be sharped if it is to conform to the laws studied above. Now with this scale as a starting point, it is easy to find the key of two sharps. In the formula *G A B C D E F G,* take the fifth tone, or *D,* as a keynote, and complete the octave, and it will again be evident that the seventh tone must be sharped.

This leads one to suspect a general law, and indeed, there is such a law, which may be stated thus:

The keynote in any scale with a sharp signature is the fifth tone in the scale with one less sharp. It makes use of just the same tones, but in addition sharps the seventh tone, or *ti,* of the new scale. This process is called *transposing by fifths.*

Keys with flat signatures, on the other hand, are *transposed by fourths.* Begin, as above, by writing out the scale from *C: C D E F G A B C.* Beginning with the fourth tone, or *F,* you will find that to keep the order of steps and half-steps correct in the new scale, the fourth tone, or *B,* must be changed to *B-flat.* This new scale, then, runs:

F G A ♭B C D E F

and its fourth tone is *♭B,* which becomes the keynote for the next scale in the ascending order of flat scales. To carry out the correct arrangement, it will again be found necessary to flat the fourth tone, or *E;* for transposing in fourths consists in taking the fourth tone of one scale as the keynote of that containing one more flat, and in flatting the fourth tone in the new scale.

A little practice will make all this very clear. Write out the scale of three flats, and from it work out the scale of four flats; of five flats. With the scale of two sharps as a starting point, work out the scale from *A;* from *E;* from *B.*

A Lesson on the Chromatic Scale. The major scale, discussed in the paragraphs above, is made up of eight tones, but within the octave there are other tones which are not included in the major scale. Altogether, there are twelve tones between a keynote and its octave, the intervals between them being in every instance half-steps. A scale which includes all these twelve tones is known as a *chromatic scale,* and since there are no tone names except the seven alphabet letters, a number of sharps and flats are necessary in writing any chromatic scale. Like the major scale, the chromatic may begin on any tone.

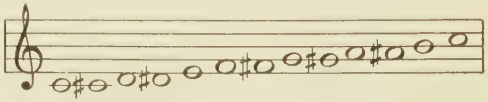
As you have done so often in other exercises, write out the letter names for the key of *C,* and describe the intervals.

C	*D*	*E*	*F*	*G*	*A*	*B*	*C*
step	step	half-step	step	step	step	half-step	

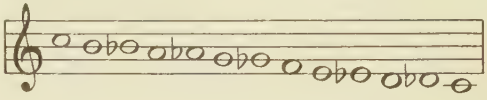
Since in the chromatic scale no interval is more than a half-step, it is evident that there must be new tones introduced between *C* and *D, D* and *E, F* and *G, G* and *A,* and *A* and *B,* and the chromatic scale from *C* will thus run:

C ♯C D ♯D E F ♯F G ♯G A ♯A B C

and on the staff will be written thus:



In an ordinary major scale, when sharps are used in the ascending scale, they are used also in the descending, but in the chromatic scale sharps are used in the ascending and flats in the descending scale. The descending scale from *C,* therefore, is as follows:



To summarize, in the ascending scale, one-sharp, two-sharp, four-sharp, five-sharp and six-sharp are added to the regular tones of the major scale, while in the descending the added tones are seven-flat, six-flat, five-flat, three-flat and two-flat.

With this in mind, write out the letter names and the staff notation from the ascending and the descending forms of the chromatic scale in the key of *F;* of *G;* of *D.*

The Syllable-Names. Every child in school learns to sing the major scale by the *do, re, mi* method, and these syllable-names have been modified so that they fit the chromatic scale with its half-steps as well. Ascending, the syllables are as follows, those in small capitals showing the added ones: *do,* DI, *re,* RI, *mi, fa,* FI, *sol,* SI, *la,* LI, *ti, do;* and descending, *do, ti,* TE, *la,* LE, *sol,* SE, *fa, mi,* ME, *re,* RA, *do.*

A Lesson on the Minor Scale. Even a person who does not readily know what a *minor* is can usually recognize a composition which is played or sung in a minor key, for it has a peculiar mournfulness. So universally is this felt that the word *minor* has come into common literary use to describe just such a state or condition. "Her life had been from first to last in a minor key," writes the story-teller, and the reader knows at once that the heroine has experienced more gloom than brightness.

Each major key has a minor key corresponding to it, and the same key signature serves for both; but the minor key has as its starting note the sixth tone in the related major scale. In the scale from *C,* for instance, the sixth tone falls on *A,* and the key of *C* therefore has as its

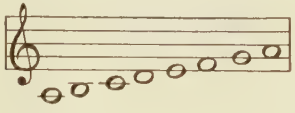
related minor the scale of *A-minor*. In the same way, the scale from *G* has as its corresponding minor the minor scale from *E;* the key of *F* has the key of *D-minor,* and so on. It is necessary always to use the word *minor,* for when the word *key* or *scale* is used without modification it is the major which is meant.

Things to Remember. Most important is the fact stated above, that the minor scale begins on the sixth tone of the major, or, in the syllable-language, on *la.* It must be borne in mind, however, that this related minor is in no sense a part of the major scale, but is complete in itself.

Then there must not be confusion of the numbers and the syllable tones. In the major scale *do* is the first and *la* the sixth tone; in the minor *la* is the first and *do* the third. The keynote of a minor composition, therefore, is never *do,* but *la.*

The order of steps and half-steps is also different in the minor scale. It has been well impressed upon us that in the major scale the half-steps are between three and four and between seven and eight, but in the minor scale there is no such uniformity, for there are three different methods of writing minor scales.

1. One form is the so-called *natural* scale, which uses only the tones of the major scale, introducing no extra sharps or flats. Such a scale in the key of *A-minor* would be written on the staff thus,

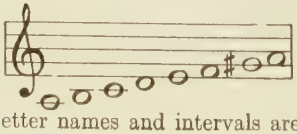


and its letters and intervals would run as follows:

A	*B*	*C*	*D*	*E*	*F*	*G*	*A*
step	half-step	step	step	half-step	step	step	

that is, the half-steps would occur between two and three and between five and six.

2. The second form is called the *harmonic* minor. It introduces one sharp, not as a key signature but as an accidental, thereby raising the seventh tone a half-step. As in the natural minor, the ascending and descending scales are the same. The staff notation is as given here,

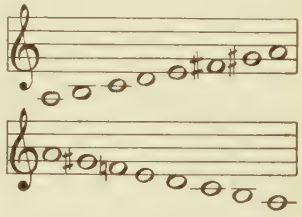


and the letter names and intervals are—

A	*B*	*C*	*D*	*E*	*F*	♯*G*	*A*
step	half-step	step	step	half-step	one and one-half step	half-step	

This harmonic minor introduces a step-and-a-half interval, which has not been met with in any scale formerly studied.

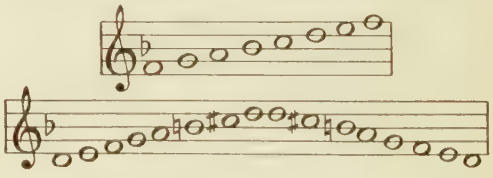
3. But the commonest form of the minor scale is the *melodic* minor, and it is this which is usually meant when the term minor is used. In the ascending scale it has the sixth and seventh tones raised a half-step by means of sharps, but in the descending for the sixth tone, and sometimes the seventh as well, is made natural. The melodic minor scale from A thus has its ascending and descending forms as follows:



Exercise. Practice writing out the major scales, each with its related minor, using the melodic form. Do this in two ways, with the letter names and with the staff, thus:

F-Major and D-Minor

Major: *F G A* ♭*B C D E F*
Minor (ascending): *D E F G A* ♮*B* ♯*C D*
Minor (descending): *D* ♯*C* ♮*B A G F E D*



It will be plain from the above example that the use of a sharp is not the only way of showing that a tone is to be raised a half-step. In the key of *F,* for instance, *B,* the fourth tone, is modified to *B-flat.* Now in the related minor key of *D,* this *B-flat* becomes the sixth tone, and must therefore be raised a half-step; and this is accomplished, not by adding a sharp, but by canceling the flat with a natural.

In a singing exercise the simplest minor scale to use is the so-called *natural.* Do not, however, confuse this with the natural key of *C,* for the natural form of a minor scale may have a number of sharps and flats. Remember that the term natural in this connection merely

means that no sharps and flats not used in the corresponding major scale are added. Sing any major scale, using the syllables *do, re, mi, fa, sol, la, ti, do;* then sing down from lower *do* to *la,* and you will have the keynote of the corresponding minor scale. Sing from this *la* to *la* above, using the same syllables as in the major scale, *la, ti, do, re, mi, fa, sol, la.* This is the natural minor scale.

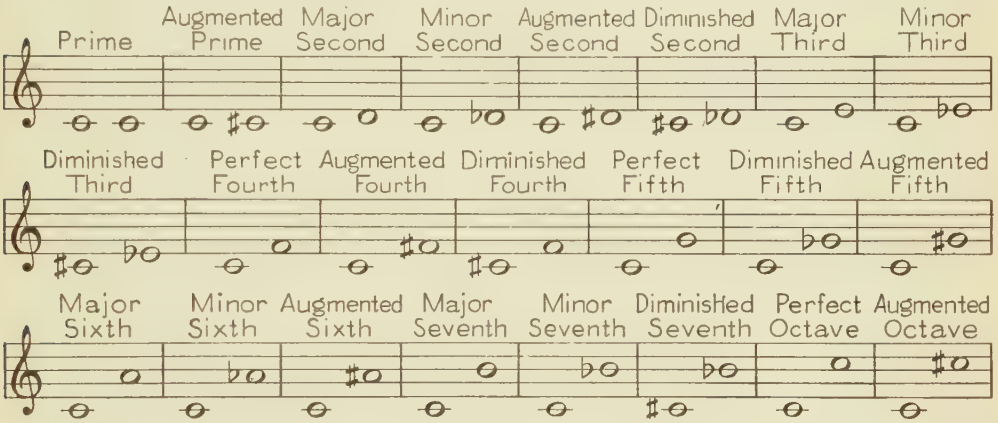
A Lesson on Harmony. As stated in the early paragraphs of this article, the ancients had no harmony—that is, they knew nothing of sounding two or more tones together. Even the very simplest "part" songs with soprano and alto were beyond their experience. But to-day, after the elements have been grasped, music concerns itself very largely with harmony. The piano pupil learns to "play with two hands;" the children in school sing in "part songs;" and the soloist sings to an accompaniment which very seldom reproduces just the notes which he is singing. To understand the rudiments of harmony it is necessary first of all to know something about intervals.

Intervals. The difference in pitch between any two tones, whether it be but a half-step or several steps, is called an *interval;* and each interval in the octave has its own specific name, according to the number of degrees it occupies. Thus the step from one of the scale to two is a second; from one to three or from three to five is a third; from one to five is a fifth, and so on. Even where sharps and flats are introduced, and an interval is then lengthened or shortened by a half-step, each interval has its name which exactly describes it. The above table gives these names in detail.

With this table before you, name the following intervals: *C* to *E; C* to *G; C* to *A; A* to *C; G* to *C; E* to *G; F* to *A; F* to ♭*B; D* to ♯*F; G* to *B; B* to *E; B* to *D.*

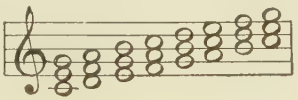
It is not necessary for the beginner to remember all these intervals in detail, for he will not make use of all of them. The simpler ones, however—the ones which contain just the tones in the major scale—should have attention. In the syllable scale, *do, re, mi, fa, sol, la, ti, do,* it is easy to name the common intervals, simply by counting. From *do* to *sol,* a fifth; from *do* to *ti,* a seventh; from *mi* to *sol,* a third; and so on. Practice the intervals, taking first the easier ones, the third, the fifth and the octave.

Chords. Two or more tones sounded at the same time constitute a *chord.* Thus every part song, no matter whether it has two, three or four parts, is made up of a series of chords.



The simplest chord for study is the one called a *triad,* which consists of three tones. These tones, however, must stand in a certain relation to each other.

Choose any tone in the scale, as *F,* and to it add its third and fifth, which are *A* and *C.* This chord of *FAC* is a triad, and a similar chord may be formed from any tone in the scale as a starting point, or *fundamental,* as it is called. Write out the letter names of the tones, using the whole series twice, thus: *C D E F G A B C D E F G A B C.* Now, using each of these tones as a fundamental, write a succession of triads by adding the third and fifth. You will have *CEG, DFA, EGB, FAC,* and so on. When you have done this draw a staff and represent your triads on it. It will appear as follows:



If to the triad is added the octave of the fundamental tone, the resulting combination of four tones is known as a *full chord.*

A triad in music does not always appear with its fundamental tone lowest, for a rearrangement does not interfere with the harmony. The triad built on C, for instance, which is *CEG,* may be inverted so that it forms *EGC* or *GCE.* With your list of triads and those you have drawn on the staff before you, rearrange them all so that they shall appear in these three positions.

The discussion of other less simple chords and of other phases of harmony is too difficult for such a study as this, but most of the combinations found in the simple songs sung in school are covered by the description above.

This study has aimed to be suggestive rather than exhaustive, as was necessary within its narrow limits. If all the suggestions made are carried out, if every principle presented is made clear through sufficient practice, the elements of vocal music will be well covered. A.MC C.

Consult Surrette and Mason's *The Appreciation of Music.* For elementary lessons in vocal music apply for catalogue of schoolbook publishing houses.

Related Subjects. The reader is referred to the following articles in these volumes:

Aïda
America
Annie Laurie
Auld Lang Syne
Band
Battle Hymn of the Republic
Cantata
Carmen
Carol
Cavalleria Rusticana
Chorus
Christmas, subhead *Christmas Carol*
Chromatic Scale
Conservatory
Gavotte
God Save the King
Hail Columbia
Harmony
Hymns, National
Hymns and Hymn Tunes
Intermezzo
Key
Lohengrin
Marseillaise
Metronome
Minstrel
Musical Instruments (with list)
Opera, subhead *Opera Bouffe*
Oratorio
Orchestra
Parsifal
Scale
Singing
Star-Spangled Banner
Te Deum
Tempo
Tone
Treble
Tuning Fork
Wacht Am Rhein, Die
Yankee Doodle

MUSICIANS

Abt, Franz
Bach, Johann Sebastian
Balfe, Michael W.
Beethoven, Ludwig von
Berlioz, Hector
Bizet, Georges
Bliss, Philip Paul
Brahms, Johannes
Buck, Dudley
Bülow, Hans Guido von
Calvé, Emma
Campanini, Cleofonte
Caruso, Enrico
Cavalieri, Lina
Chadwick, George W.
Chaminade, Cecile L. S.
Cherubini, Maria Luigi
Chopin, Frederic F.
Coleridge-Taylor, Samuel
Dalmores, Charles
Damrosch, subhead *Leopold Damrosch*
De Koven, Reginald
Destinn, Emmy
Donizetti, Gaetano
Dvorak, Antonin
Eames, Emma
Eddy, Clarence
Farrar, Geraldine
Flotow, Friedrich von
Foote, Arthur
Foster, Stephen Collins
Fremstad, Olive
Gadski, Johanna
Garcia
Garden, Mary
Gilmore, Patrick S.
Gluck, Alma
Gluck, Christoph W.
Gottschalk, Louis M.
Gounod, Charles F.
Grieg, Edvard Hagerup
Guido of Arezzo
Guilmant, Felix A.
Handel, George F.
Haydn, Josef
Heber, Reginald
Henschel, Georg
Herbert, Victor
Hofmann, Josef
Homer, Louise
Humperdinck, Engelbert
Joachim, Joseph
Kellogg, Clara Louise
Kubelik, Jan
Lind, Jenny
Liszt, Franz
McCormack, John
MacDowell, Edward A.
Mascagni, Pietro
Massenet, Jules É. F.
Melba, Nellie
Mendelssohn-Bartholdy Felix
Meyerbeer, Giacomo
Mozart, Johann Wolfgang
Muratore, Lucien
Nevin, Ethelbert
Nielsen, Alice
Nilsson, Christine
Nordica, Madame
Paderewski, Ignace Jan
Paganini, Niccolo'
Palestrina, Giovanni da
Patti, Adelina M. C.
Powell, Maud
Puccini, Giacomo
Remenyi, Edouard
Reszke, Edouard and Jean de
Root, George F.
Rossini, Gioachino Antonio
Rubinstein, Anton G.
Ruffo, Titta
Saint-Saens, Charles C.
Schubert, Franz
Schumann, Robert
Schumann-Heink, Ernestine R.
Scotti, Antonio
Seidl, Anton
Sembrich, Marcella
Sinding, Christian
Smetana, Friedrich
Sousa, John Philip
Strauss, Johann
Strauss, Richard
Sullivan, Sir Arthur S.
Tetrazzini, Luisa
Thomas, Theodore
Tschaikowsky, Peter I.
Urso, Camilla
Verdi, Giuseppe
Wagner, Wilhelm Richard
Weber, Karl Maria von
Zeisler, Fannie

MUSICAL INSTRUMENTS. As musical knowledge has increased and interest in music has widened, more and more instruments have been fashioned for the production of musical effects. Each, however little it may differ from some other, has its peculiar properties, and there are few that the music lover would be willing to dispense with.

Related Subjects. The following instruments are given separate treatment in these volumes:

Accordion
Aeolian Harp
Bagpipe
Banjo
Bassoon
Bass Viol
Bugle
Clarinet
Concertina
Drum
Dulcimer
Fife
Flageolet
Flute
Guitar
Harmonica
Harp
Harpsichord
Horn
Jew's-Harp
Lute
Lyre
Mandolin
Oboe

Ocarina	Trumpet
Organ	Viol
Piano	Violin
Piccolo	Violoncello
Saxophone	Xylophone
Tambourine	Zither
Trombone	

See, also, the article ORCHESTRA, for illustration of instruments used.

MUSK, an oily, strong-smelling substance obtained from the musk deer (which see). Because of its powerful and enduring odor it is used extensively in compounding perfumes. True musk is rare and has many commercial substitutes. An odor resembling musk is found in several animals and in a few species of plants, and artificial musk has been produced by a combination of chemical elements. The most valuable variety, called tong-king, is imported from China. The secretion is dried, reduced to a brownish powder, and exported in small lead- or tin-lined boxes. Musk is also used in medicine as a stimulant.

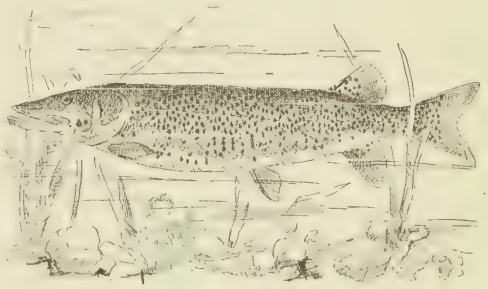
MUSK DEER, a small, clumsy deer found in the higher Himalayas, parts of Tibet and Siberia. It has no antlers; two large, tusklike teeth overhang the lower lip. Instead of ranging in herds, as does the ordinary deer, the little musk deer roams about alone and only at night; it is very timid and for that reason difficult to hunt. The musk deer is pursued for the tiny musk pouch found on the males, from which comes the musk that is used in perfumery and medicine. See MUSK.

MUSKEGON, MICH., the county seat of Muskegon County, is situated on the Lake Michigan shore of the state, at the mouth of Muskegon River. Grand Rapids is thirty-nine miles southeast, and Detroit is 196 miles distant, also southeast. Chicago is 189 miles southwest by rail and 110 miles by water. Transportation is provided by the Pere Marquette, the Grand Rapids & Indiana and Grand Trunk railroads, and an interurban line. Lake steamers connect with all important lake ports throughout the year, and there are daily sailings to Chicago. The population increased from 24,062 in 1910 to 36,570 in 1920 (52 per cent gain), Scandinavians and Dutch comprise thirty-five per cent of the foreign born. The area exceeds six square miles.

Muskegon is the largest city on the eastern shore of Lake Michigan, and has the largest harbor on that shore. The construction of two dams in the river has greatly increased the industrial activities of the city; the leading manufactures are motors and billiard-room and office furniture, the factories employing about 5,000 people. Other products are paper, electric cranes, knit goods, boots and pianos; and these, with lumber, fruit, celery and farm products, comprise the chief articles of an extensive trade. Through the generosity of Charles H. Hackley the city has a fine art gallery, a public library, a gymnasium, a manual training school, an endowed hospital, a public square, a soldiers' monument and some handsome bronze statues; some of the city's institutions bear his name. The Federal building was erected in 1907 at a cost of $60,000. Large numbers of visitors are annually attracted to Muskegon for the charming scenery and the boating, fishing and bathing facilities of the vicinity. McGraft Park of forty-seven acres and Hackley Park are the city's recreation grounds.

Muskegon was settled in 1834, but a trading post was established here as early as 1812. The village was incorporated in 1861, and a city charter was granted in 1870. Before 1890 the city was noted as one of the largest lumber-producing cities in the world, but no mills are now in operation. P.P.S.

MUSKELLUNGE, *mus keh lunj* (accent first or third syllable), a magnificent game fish, the largest of its family, often reaching a length of eight feet and a weight of 100 pounds or more. Its general form is that of the common pike;



THE MUSKELLUNGE

in color it is dark-gray, having on its sides round, blackish spots of a varying size on a background of silvery-gray. The muskellunge is more commonly found in lakes Michigan and Erie, but is native to all the lakes of the Northern United States, to the upper Saint Lawrence River and to the lakes of Western Canada. It is considered one of the best food fishes, even equaling the black and striped bass. The usual method of capture is by trolling, in which a heavy hook, stout line and live bait are used; the fish is abundantly able to try the skill of the most expert angler.

The state of New York has been propagating the species known as *Chautauqua muskellunge*, for many years with notable success. It reaches a length of five feet, and is also called *salmon pike* or *white pickerel;* its white and delicate flesh is highly esteemed by good judges of food fish. See PIKE.

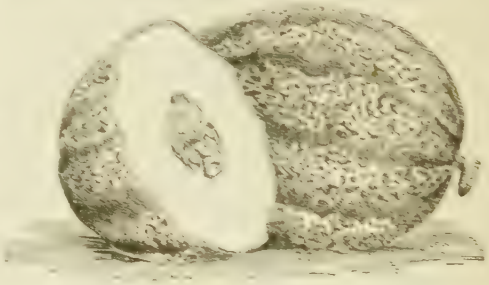
MUS'KET, the name of the weapon with which soldiers were armed previous to the introduction of the modern rifle. The musket used by the British army at the time of the Battle of Waterloo (1815) was affectionately referred to as "Brown Bess." While this was a great improvement over previous weapons, one man armed with a modern Springfield rifle would easily be a match for twenty with the musket of those days. The first muskets used in the sixteenth century were cumbersome weapons fired by a lighted torch or fuse, and too heavy to handle without a support.

Next came a musket fired by a wheel which, by friction, produced sparks from a piece of flint. This led to the old flintlock musket, which sometimes exploded, sometimes did not, by a spark from a piece of flint striking against a steel pan in which was placed a small quantity of powder. The introduction of central fire cartridges finally sounded the doom of the musket, which gave place to the rifle (which see). In addition, see SMALL ARMS.

MUSKHOGEAN, *mus ko ge'an*, the name of the chief tribe of North American Indians of the Creek confederacy, which includes the Creeks, Choctaws, Chickasaws, Seminoles and others. Formerly, they ranged all over the state of Mississippi, western Tennessee, eastern Kentucky, Alabama and Georgia, and later wandered through Florida. When the Spaniards landed on the Gulf coast in 1527 they found the Muskhogean living in fortressed villages, engaged in agriculture. They were much more intelligent and progressive than any other Eastern tribe of Indians. They had an elaborate social organization, each tribe living in a separate village. The remnants of the tribe now live on a reservation in Oklahoma. See INDIANS, AMERICAN.

MUSK'MELON, the sweet, luscious fruit of a vine belonging to the gourd family; the *musk* part of the name refers to its delicious, aromatic flavor. There are several more or less distinct botanical varieties, classified according to the shape, size and character of the fruits. They vary in size from a few inches to over a foot in diameter; some are oblong and others are nearly spherical in shape. The rind in these varieties shows differences in appearance and in degree of hardness, and the flesh is of various colors, including white, red, green, yellow and intermediate shades.

Muskmelons (sometimes incorrectly called *mushmelons*) are cultivated in warm climates all over the world. The greater portion of those raised for the American and Canadian markets are divided into two groups—*cantaloupes* and *nutmeg* melons. Strictly speaking,



AN "OSAGE" MELON

a cantaloupe is a muskmelon with a hard, scaly rind, which is often deeply furrowed. The name comes from that of a town near Rome (Cantalupo), whither the plant was first brought from its native home in Armenia. Nutmeg melons have softer, more or less netted rinds, and they ripen sooner than cantaloupes. However, the public does not readily distinguish between these varieties, and the name cantaloupe is applied without discrimination to both varieties.

These fruits require a warm soil and one in which their growth will be rapid. Six to ten seeds are planted, early in the spring, in hills four to six feet apart. If the soil is poor, manure fertilizer is used in each hill to hasten growth. In the north it is customary for commercial growers to start the plants in hothouses and to transfer them to the open field when warm weather arrives. Care should be taken to plant muskmelons some distance from squash, for the bees and winds sometimes spoil the flavor by mixing the pollen from the flowers of the different plants. The special enemies of the fruit are the striped beetle and the flea beetle, for they eat the leaves of the vine. These troublesome insects may be kept under control by spraying the leaves with Paris green or dusting them with tobacco dust or air-slaked lime. Applications of Bordeaux mixture will keep in check downy mildew and leaf-spot diseases, by which the plant is liable to be attacked.

Food Value. Muskmelons have almost the same fuel and nutritive value as peaches, and they compare favorably with apples, pears and oranges as a table fruit. Their chemical composition is on the average as follows: water,

THE AVERAGE CROP

Including both muskmelons and cantaloupes, from six principal growing centers.

89.5 per cent; protein, 0.6; carbohydrates (starches and sugars), 9.3; ash, 0.6. They have a fuel value of 185 calories per pound (see CALORIE; FOOD, subhead *Chemistry of Foods*). Like other table fruits, their high water content makes them a valuable laxative food, and their agreeable taste and tempting appearance help to make eating them a delight, thus serving the appetite and the digestion. M.W.

MUSKOGEE, *mus ko' ge,* OKLA., the county seat of Muskogee County and a railroad center and distributing point of importance. It is situated at the head of navigation on the Arkansas River, forty-five miles from the eastern state line and about midway between the northern and southern state borders. McAlester is sixty-four miles southwest, and Kansas City is 250 miles north and east. Four railway lines serve the city—the Missouri, Kansas & Texas, the Missouri, Oklahoma & Gulf, the Midland Valley and the Saint Louis & San Francisco. Muskogee was settled in 1890 and was incorporated as a city in 1898; it adopted the commission form of government in 1910. The name is that of a Creek tribe of Indians, and is said to signify an *abundance of water.* An increase in population from 25,278 in 1910 to 30,277 in 1920 indicated an increase of 20 per cent in ten years. The area is eight and one-half square miles.

The surrounding country is rich in natural resources and well adapted to growing cotton, grain (especially wheat), fruits, vegetables and alfalfa, but cattle raising is the chief industry. The agricultural products named, with the manufactured products, hardware, implements and brooms, comprise the leading articles of commerce. The large machine shops of the Missouri, Oklahoma & Gulf Railroad are located here; the city also has cotton compresses, cotton gins and oil refineries. Oil and natural gas are found in abundance. In keeping with the city's recent growth are its public and business buildings, the most notable being the ten-story structures of the Severs Hotel and the Barnes office building, each costing $350,000; the Metropolitan, Phoenix, Surety, Flynn-Ames buildings and the courthouse, all constructed of reënforced concrete, and costing from $250,000 to $300,000 each. The Federal building, completed in 1915 at a cost of $750,000, is the largest government building in the southwest. An imposing high school building is also worthy of note. Muskogee has Saint Joseph's College, Bacone Indian University (Baptist), opened in 1884, the Oklahoma Woman's College, the Oklahoma State School for the Blind, the Spaulding Female Institute, a business college and a Carnegie Library. The city is the headquarters of a government Indian agent. Features of interest in the vicinity are Fort Gibson and a national cemetery. E.D.B.

MUSKOKA, LAKES, a chain of Canadian lakes, in the northwest part of the Ontario peninsula. They lie twenty to thirty miles east of Georgian Bay, and about midway between Toronto on the south and the main line of the Canadian Pacific Railway on the north. The Muskoka district, from the shores of Georgian Bay eastward, is one of the most famous pleasure grounds in America, and is visited each year by thousands of tourists and summer residents. It includes from 800 to 1,000 lakes, and comprises an area of 3,500 or 4,000 square miles. Most of the region is included in the so-called "highlands of Ontario," and has an average altitude of 200 feet above Lake Huron.

The characteristic ruggedness of the Laurentian Highlands is perhaps the chief scenic attraction. The hundreds of lakes and small streams are bordered by stately pines, giant hemlocks, fragrant balsams and wide-spreading maples. The shores are generally high and somewhat rocky; granite and gneiss are the predominating rocks. The total absence of limestone formations gives the waters of the region a special medicinal value, especially to persons whose blood pressure is very high. But

Muskoka is not a resort for invalids; it is rather a playground. The month of August is the height of the social "season," but in June, July and September Muskoka is equally, if not more, attractive to the visitor who comes for an outing.

There are so many points of interest in Muskoka that it is possible to name only a few. The largest of the lakes is Muskoka, which has given its name to the section. It covers fifty-four square miles, and is twenty miles long and from two to eight miles broad. Rosseau and Joseph are smaller lakes near by. There are many fine waterfalls, notably the Bridal Veil Falls on the Shadow River, the High Falls and the South Falls (130 feet) on the Muskoka River, and Skelton Falls on the river of the same name. For the visitor who does not care to spend all his time in viewing the wonders of nature, there are golf, tennis, boating, bathing, fishing and other diversions. The Grand Trunk, the Canadian Pacific and the Canadian Atlantic make access to the region easy.

MUSK OX, a curious, long-haired, shaggy beast, between an ox and a sheep in appearance, with a musky odor which gives the species its name. It is about six feet in length, and the entire head and body are covered with dark brown hair, curly and matted on the shoulders, but hanging straight on the rest of the body. There is a patch of yellowish-white on the back, between the horns and below the knees, and the horns of the male are heavy, covering the forehead and curving downward. The musk ox was formerly found in the Arctic Sea regions in immense numbers, but is now common only in Arctic America, from Hudson Bay to the Mackenzie River and in Northern Greenland. These animals associate in herds, and their movements are described as very sheeplike. Their food consists of young willows, lichens and grass, and they are reported to breed only once in two years. Unlike the musk deer, the musk ox has no special gland for the secretion of musk. Its wool is spun into coarse fabrics, and its flesh forms an important item in the food supply of the Eskimos.

MUSK OX

MUSK'RAT, a large-sized member of the mouse family, sometimes called a "cousin of the beaver," because of its burrowing habits. It received its name from the strong, musklike odor of a fluid secreted in a large gland present

THE MUSKRAT

in both sexes. The animal is about a foot long, and has a nearly hairless tail about eight inches in length. Its plump, thickset body is covered with an undercoat of thick, soft fur, and with an outer coat of long, shining hairs, dark brown above and gray below. The head is broad and rounded, the ears small and closely set, and there is no distinct neck. Like other aquatic animals, the muskrat has its hind toes webbed. It is distributed throughout North America from the Rio Grande to the Arctic seas, and from the Atlantic to the Pacific coast.

The muskrats dig their homes on the banks of streams and lakes. Their burrows consist of a central chamber with a number of passages, all opening beneath the surface of the water. They are agile swimmers and divers, and feed on the roots, stems and leaves of water plants and on fruits and vegetables found near their homes. They are hunted and trapped in the spring. Some are shot while swimming in the streams or resting on the banks; others are caught in steel traps which are placed beneath the water at their landing places. Their fur, which is dyed to imitate marten and mink, is used for making caps, gloves and coat linings, trappers receiving varying prices for skins, according to size. Muffs made of light-colored fur may be bought for $15; the more expensive sets, made of dark

fur, cost about $100. When the long hair is removed and the silky underfur dyed, the latter is sold as Hudson seal.

MUSLIN, *muz'lin,* a fine cotton fabric, named after the city of Mosul in Mesopotamia, where it was first made. Muslin manufacture was introduced from India into Europe about the end of the seventeenth century, and is now extensively carried on in France, Great Britain and the United States. India and the other Eastern countries now make almost no muslin, and depend for their supply on the nations of Western Europe. Muslin is usually woven plain, similar to calico, but its texture is more like that of gauze. It is sometimes adorned with figured patterns, printed by the same processes as in calico printing, and is principally used for women's dresses, curtains and hangings.

MUSSEL, *mus''l,* from the Latin *musculus,* meaning *small fish,* is the name given two groups of hard-shelled animals, one found in the sea, and the other in fresh water. They belong to the division known as *mollusks* (which see), and have a soft, dark-colored body enclosed in a hinged shell consisting of a right and a left valve. The common sea mussel of the north temperate zone is used extensively as food by Europeans, and by American fishermen as bait. Farmers near the coast regions find it a valuable fertilizer. This mussel is usually about three inches long, though some of the largest specimens are twice that length. Its shell is black on the outside, pearly-blue within. By means of a tuft of long, silky filaments at one end of the shell the mussel anchors itself to rocks, sometimes remaining fixed for a lifetime. Fresh-water mussels are chiefly valued because they produce fresh-water pearls (see PEARL), sometimes worth as much as $25,000. For an important class of mussels see CLAM.

MUSSET, *mü seh',* ALFRED DE (1810-1857), a French poet, dramatist and novelist, born in Paris. His boyhood was passed among surroundings which developed his literary tendency, for his father was a man of letters, and other writers came often to the house. After his graduation, with honors, from college, he studied law for a time and then medicine, but found both professions distasteful and decided to devote himself entirely to literature. His first volume of poems, *Tales of Spain and Italy,* appeared when he was but twenty years old, and with the two volumes which followed, in 1831 and 1832, won him prominence in the world of letters. His next productions were dramas, some of which met with considerable success. Attempting as they do to combine the merits of the classic and the romantic schools, they are the most original dramatic works produced in his generation. The dialogue is particularly brilliant. Several of his novels, notably *The Confessions of a Child of the Age, Margot* and *Mimi Pinson,* are of special interest because they contain much autobiographic material. It is as a poet that Musset ranks highest, however, much of his work holding a place with the best poetry produced in France.

MUS'TARD, the common name of two species of the botanical family of the same name (see subhead below). These are the *black* and *white mustard;* they are annual plants, both in Europe and in America. In the United States black mustard appears as a weed, growing to a height of more than six feet in southern California, and forming hedges which it is impossible to penetrate. White mustard, although in all other ways resembling the ranker species very closely, seldom grows taller than two or three feet. The plant itself is dark green, with stiff, branching stems; it is covered with bristling hairs below, which disappear toward the top. From June to September it blooms with small, brilliant, yellow flowers. This plant has great commercial value. The pods, which are very small, and contain only one row of seeds, are gathered before fully ripe and allowed to ripen. When dry they burst open, and the seeds are then shaken out and ground. Mustard has no odor until water is added. The liquid preparation is given in small doses for the treatment of dyspepsia, and as an emetic; more commonly, mustard is used in making plasters. Commercial mustard, which is used for food flavoring, is usually much adulterated with flour.

BLACK MUSTARD

The Mustard Family, or **Cruciferae,** *kroo sif' er e,* has 1,800 species and is easily distin-

guished. Plants of this family are very sharp to the taste, and have flowers in the shape of Greek crosses (from which the name *cruciferae,* which means *cross-bearing* in Latin, is derived). They also have pods which open below. Mustard, radishes, cabbages, cauliflowers and cress all belong to this family. The seeds contain an oil which is used as fuel in lamps and as a medium in oil painting.

Related Subjects. The reader is referred to the following articles in these volumes:

Annuals	Horse-Radish
Cabbage	Radish
Cauliflower	Turnip
Cress	

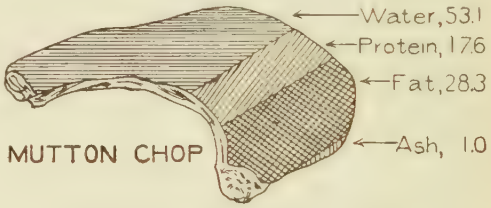
MUTSUHITO, *moot soo he' toh* (1852-1912), for over forty years emperor of Japan, was born in the mountains of Kyoto. The liberal education he received was superintended by his mother, and with her he lived quietly until 1868, when he was crowned at Osaka. The country was at this time torn by dissension and strife, following upon Commodore Perry's entrance into Japan and the treaty of 1854, whereby the country was opened to the Occident and concessions were granted to the foreigners. Japan was about to emerge from its twelfth century existence. To bring about peace and order, first of all, Mutsuhito aimed to get the government under his personal control; to this end he removed the capital from Kyoto to Yeddo, and called it Tokyo, or Eastern Capital.

Mutsuhito ascended the throne of a truly medieval country in a century of great enlightenment among other nations; in less than fifty years his son was crowned emperor of a great and powerful modern nation, a transformation due to the constructive ability of Japan's greatest ruler. Among the many foreign changes and reforms he introduced are the following: the establishment of deliberative assemblies, accompanied by the destruction of the last traces of feudalism, as the nobles voluntarily, one by one, guided by high motives of patriotism, surrendered their privileges; the adoption of the European calendar and European costumes in the court; the teaching of English in the schools; the adoption of a new judicial system, founded on the Code Napoleon, and the abolition of torture. These efforts to secure modern innovations were for a time violently resisted and three times led to internal rebellions, but Japan emerged from medievalism to a foremost position among the great modern nations within an incredibly short period.

Twice serious conflicts arose with China, first in 1874, over the possession of Formosa, and again in 1894, over the fortress Port Arthur. These troubles led the emperor to give much thought to the Japanese navy, resulting in the construction of a powerful fleet of warships. In the Russo-Japanese War Mutsuhito maintained close personal supervision of affairs, but the great success of the Japanese army was due to his trust in those whom he placed in charge. His generosity was marked, and he was greatly loved and respected by his subjects, for his human qualities as well as for his extraordinary powers of statesmanship. He was also a poet of distinction. His one son, Yoshihito (which see), succeeded him. See JAPAN, subtitle *History of Japan.*

Consult Longford's *The Evolution of New Japan.*

MUTTON, *mut''n,* sheep's flesh, a standard table meat which ranks with beef in digestibility, and has about seven-eighths of its nutritive value (see BEEF). Mutton of good quality is pinkish in color, close-grained and contains



FOOD VALUE OF A MUTTON CHOP
The fuel value of mutton is about 1475 calories per pound. It is practically equal to round steak.

a considerable amount of hard, white fat. Because of its pronounced flavor, the flesh of sheep is cooled and "ripened" before it is sent to the market. There is a standard method of dividing the carcass into "cuts," similar to that for beef (page 658). The meat of a young sheep is called lamb; tallow (which see) is made from the fat of the animal.

Australia, Argentina (South America), the United States and New Zealand are the principal sheep-raising countries, and all are important producers of mutton. European markets are supplied by Argentina, Australia and New Zealand, as the United States produces only enough for home consumption. Sheep carcasses are frozen hard in a refrigerating room before being shipped away, and in this way they arrive at their destination in good condition, even after a long journey. S.L.A.

MYCENAE, *mi se' ne,* one of the most ancient cities of Greece, which flourished in

the Heroic Age before the Trojan War. It was situated in the Peloponnesus on a hill above the Argive Plain, about six miles northeast of Argos. Excavations are continually going on at Mycenae, and the place seems to be an unlimited storehouse of ancient relics. It is supposed to have been the home of Agamemnon, and his traditional grave, as well as that of Cassandra, has been found there. Recent discoveries show that the people of Mycenae considered it also the home of Odysseus. The great wall of Mycenae has been standing since the founding of this ancient town, which was overthrown by the Argives in 463 B. C. See SCHLIEMANN, HEINRICH.

MYOPIA, *mi o'pi a,* a form of defective eyesight which is commonly known as *near sight* or *short sight.* The source of the trouble is that the eyeball is too long. As a result, rays of light are brought to a focus in front of the retina, instead of on it, and this causes the image to be blurred. (The reader will find a full discussion of the process of seeing in the article EYE, subhead *How We See.*) Nearsighted persons must wear glasses having concave lenses; that is, lenses thin in the middle and thick at the edges. Such lenses are the opposite of the eye in shape, and they bring the light rays to a focus on the retina, thus correcting the trouble. Some persons are born nearsighted, but in others the defect is developed by misuse of the eyes, such as doing close work for long periods without rest. Those who have defective eyesight should keep in constant touch with a competent oculist. The glasses should be changed as needed, and eyestrain should be guarded against. Neglected myopia may develop into blindness. See EYE, subhead *Care of the Eyes;* BLINDNESS. R.J.T.

MYRIAPODA, *mir i ap' o da,* a group of long, slender, wormlike animals, represented by the centipedes, galleyworms and millipedes. Their class name, which means *having ten thousand feet,* refers to their numerous appendages, which serve as legs. They have a distinct head bearing one pair of antennae, or feelers (see ANTENNAE), and have simple or compound eyes; a few have no eyes. Their bodies are divided into numerous segments, seldom numbering less than twenty-four; on these are borne the hairlike appendages by which the animal moves forward. The higher forms have fewer legs than the lower, and these are jointed like those of insects, with which they were originally classed; they are now considered a distinct class of jointed animals (see ARTHROPODA). Myriapods are found in all parts of the earth, and mostly inhabit dark, damp places; they range in size from minute forms which are almost invisible to those having a length of six inches. The eggs of some species are numerous, from sixty to one hundred being deposited at one time. The claws of the centipede, which contain poison, are weapons of attack and defense. Other myriapods are defended by poison fangs and scalding fluids.

MYRRH, *mur,* a fragrant, gumlike substance which oozes from a species of shrub found growing in parts of Arabia and Eastern Africa. The plant itself has scanty foliage, small green flowers and oval fruits. The oil from the gum is used in medicines, incense and perfumery. There are many references to it in the Bible, but the one with which we are most familiar is found in *Matthew* II, 11:

"They [the wise men] saw the young child with Mary, his mother, and . . . . presented unto him gifts; gold, and frankincense, and *myrrh.*"

England has preserved a pretty custom in connection with this sacred incident, for the subjects of the queen present her annually with these three gifts at the feast of Epiphany (which see), in the Chapel Royal in London.

MYRTLE, *mur't'l,* a group of plants belonging to the myrtle family, the best-known representative of which is a beautiful evergreen shrub or tree which bears shining blue-green, long, oval leaves and white flowers. This plant, known as the common myrtle, is quaintly described in a poem by James Montgomery, a Scottish poet:

MYRTLE

(*a*) Branch, with flowers; (*b*) vertical section of flower; (*c*) calyx, torus and pistil; (*d*) fruit.

Dark-green and gemmed with flowers of snow,
With close uncrowded branches spread
Not proudly high, nor meanly low,
A graceful myrtle reared its head.

The common myrtle is native to the countries bordering on the Mediterranean Sea and to the temperate regions of Asia. The leaves, bark, flowers and berries are aromatic and are used in the manufacture of perfumery, while

the bark is utilized in the tanning industry in several sections of Southern Europe. Among the ancient Greeks the myrtle, as a symbol of youth and beauty, was sacred to Venus and found a place frequently in the greatest of their festivals.

Among other species of myrtle are the small-leaved myrtle of Peru, which bears sweet red berries of a very pleasing flavor; and the guava of Chile, which grows as a tree and produces a hard, useful wood. In California various species are cultivated as ornamental outdoor shrubs.

MYSORE, *mi sohr',* a city of Southern India, capital of the native state of Mysore. It is picturesquely situated at the base of a hill whose summit, crowned with temples, rises nearly 3,500 feet above the sea. Though a town of ancient historic associations, for it was in existence three centuries before Christ, Mysore has many modern features and possesses several handsome public buildings. In the center of the city is an old fort containing the maharajah's palace. Other points of interest are the Maharajah's College, the law courts and the Victoria Jubilee Institute. The manufacture of carpets is a thriving and important industry. Population, 1921, 83,932.

MYSTERIES, *mis'ter iz.* In ancient Greece, and later also in Rome, solemn religious celebrations were held in honor of certain gods or goddesses, to which no one was admitted except those initiated and under the vow of secrecy. Violation of the vow meant death. This explains the name *mystery,* coming from the Greek word meaning *initiate.* Their purpose was not only to render worship, but to instruct the people in religious observances and by mystic dramas to preserve the traditions connected with the divinity. In some of the mysteries only a limited number of priests took part; others were participated in by many people.

The greatest of all the Greek mysteries were the *Eleusinian,* celebrated in honor of Demeter and her daughter Persephone. Others were the *Dionysian,* devoted to the worship of Dionysus, or Bacchus, in the nature of wild orgies, which later became so corrupt that they were prohibited; the *Samothracian,* celebrated in Samothrace, especially, in honor of the Cabeiri, or great gods; and the *Orphic,* connected with the cult of Dionysus and practiced by private sects claiming to possess secret knowledge of the means to win happiness after death.

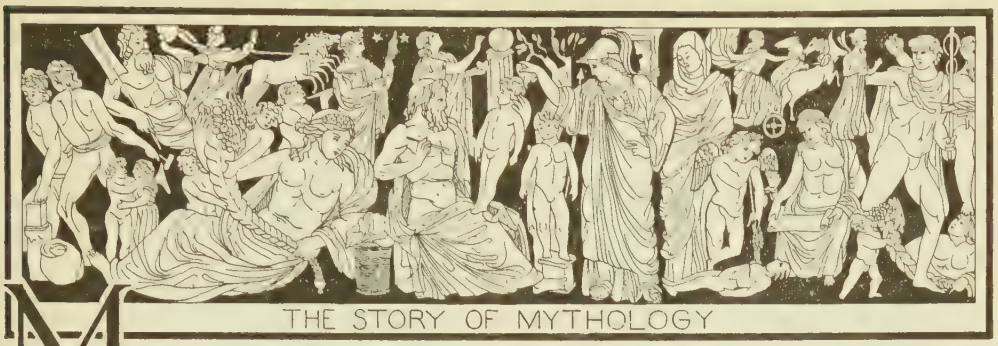
Even to-day no one knows for a certainty the real meaning behind the different mysteries. Such knowledge as we possess of the rites has been gathered mainly from vases and inscriptions unearthed in excavating the ruins of ancient cities.

MYSTERY PLAY, one of the earliest of medieval dramas, usually a representation of scriptural scenes and incidents. Often, however, the name is used interchangeably with that of the miracle play, which was, strictly speaking, a dramatic spectacle founded on the lives of the saints. In its beginnings the mystery was little related to the older drama, for it grew up in the Church and was used by the clergy as a means of instruction and as a method of impressing the attendants on the services. Some special scene from the Bible would be chosen and presented by the clergy in the Church; thus, at Easter the resurrection might be rudely shown, at Christmas the journeying of the magi, the wondering shepherds and the worship of the Babe in the manger.

In the course of time, these plays became more and more dramatic and passed out of the hands of the clergy, usually to the various trade guilds. The streets or public squares were the scenes of the performances, which were given on movable stages. Sometimes very elaborate series were worked out, which included almost the whole Scripture narrative and required a number of days for their performance. Thus, certain cycles survive which consist of 32, 42 and 48 plays respectively.

The dates during which mystery plays were popular are not, of course, sharply defined. The earliest and crudest, perhaps, took place as early as the beginning of the eleventh century, while the last mystery of which there is positive record was performed in 1580, after the regular drama had obtained a firm foothold. The Passion Play, given every ten years at Oberammergau, is closely related to the old mystery plays.

MYSTICISM, *mis'ti siz'm,* a term which includes various ideas of worship, philosophy and religion. It attempts to define the tendency in human nature to seek soul satisfaction and supreme happiness in things spiritual, where the material fails to satisfy, and it endeavors to account for the exalted, ecstatic state of those far advanced in spiritual life, who feel at one with the Deity. The term is carelessly used as the opposite to rationalism, but mysticism is often coupled with great administrative power; some of the greatest men and women of all ages have been mystics. See RATIONALISM.



THE STORY OF MYTHOLOGY

MYTHOLOGY, *mi thol' o ji.* Hundreds and hundreds of years ago, when the nations of the world were in their infancy, there were many questions for which people could find no answers. There were no works on astronomy to explain to them that the sunrise is not a real rising of the sun, but is caused by the turning of the earth on its axis; or that the coming of winter after summer is a natural effect of natural causes, and not the work of some malignant power. There were no works on geology to tell of the slow upbuilding of the world through thousands and hundreds of thousands of years; no works on physics to explain that an echo is not an answering voice, but the same voice thrown back by some obstruction. But all of these were natural questions, and the inquiring minds of those primitive people must have satisfaction, so they made up answers and wove them into some of the most beautiful stories and fancies the world has ever known.

This does not mean that some wise man simply invented, all at once, the explanation of such a marvel, for instance, as the sun, with its rising and setting. The explanation grew up gradually. So wonderful an object, which made the whole world bright when it appeared in the east and left the whole world dark when it disappeared in the west, must be more than human; and thus there grew up the idea that the sun was a god—one of the strongest of the gods. Even a god could not walk across the great stretch of the sky between morning and evening, so he was given a chariot with two, four or six horses. True, his face and form could not be seen, but that was because his chariot, his raiment and his crown were so brilliant. In time such stories grouped themselves about almost every natural object: the rustling of the leaves was but the murmuring voice of the goddess who lived in the tree; the hurrying stream was a nymph rushing to join her lover, the sea; the stars were virtuous people placed by the gods in the sky that their virtues might never be forgotten. And the sum of these stories which any people built up for itself is its *mythology.*

Classes of Myths. Many of the legends and myths were of this kind, answering natural questions about natural objects, and these are known as *explanatory* myths. But there are others which have no such object—which seem, indeed, to have no object but to entertain—and these are called *aesthetic* myths. They tell of the doings of gods and heroes—marvelous doings, often, which prove that however strong the gods may have been, they were not always very good. Such stories as that of Jupiter in pursuit of Europa, or of Jason in search of the Golden Fleece, are of this kind.

Why Study Mythology? Why should learned men, with the knowledge of the world at their fingers' ends, interest themselves in these old fables and legends? What is there to be gained from such study? Much, they tell us, which can be gained in no other way, for the mythology of a people makes clear its ideals, its attitude toward natural happenings, and much about its state of civilization and mode of life. For *a mythology is the religion of a primitive people,* and its science and literature as well. To be sure, those words cannot be taken in just their modern meaning. The old myths were a religion because they set forth the doings of the gods and told the people what worship and sacrifices and ceremonies the gods demanded of them; but in other ways they were very unlike a religion as that word is commonly understood to-day. For one thing, the gods whom these myths centered about would seem to the modern mind very unfit to be deities, for they were not only jealous and cruel and vengeful, but actually immoral as well. There is a very long word which scholars apply to this sort of a religion—*anthropomorphism;* but it is

not a difficult word. It is taken from a Greek word signifying the *human form,* and simply means the attributing of human form and qualities to a divine being.

Then, too, a religion in the modern sense of the term is supposed to try to better people morally, but few of the old mythologies made any such attempt. An ancient Greek, for instance, might lie and steal, but so long as he offered his homage to the gods, and had certain qualities of character, such as courage, he was all right in their sight. Indeed, there was one powerful god, Mercury, who had special charge of thieves and helped them out of their difficulties.

As for science, mythology has a right to that name only in the sense referred to above. It did not, as a modern science does, try to trace effects from causes or work backward to causes from visible effects; it contented itself with assigning supernatural causes to natural events.

Because of the light it throws on all these phases of ancient life, scholars find mythology worthy of study; but the ordinary reader need not go so far for his reason. It is interesting—that is enough; and any child who loves fairy tales cannot fail to be fascinated by these stories woven in the morning of the world when everything was as fresh, as untried, as unexplained to the wisest man as it is to the little child to-day.

Some Interesting Questions. About many of the myths that have come down to modern times there is one very curious fact. It will often be found that a myth which grew up in Greece or in Egypt bears a striking resemblance to one woven by the Norsemen far away in their land of ice, or even that some American Indian tale is strangely like one that the Romans made. Even the wisest scholars have never been able to account absolutely for such resemblances. Some declare that far, far back, long before recorded history began, all these peoples must have had a common ancestry, and that the myths were invented before the separation took place and were carried by each people to their new home, where gradually among new surroundings changes crept in and details were forgotten.

There is another theory, however, which satisfies more scholars. That is that the different primitive peoples, finding themselves in the same world with the same things going on about them, asked themselves the same questions and invented similar explanations.

Then there is another interesting question—whence came all those myths that show the gods as unjust and capricious? Perhaps, declare some students, wise men invented those in which the gods appear as good and kindly, thinking that they might be helpful to the people, while story-tellers of a later time made up the others in a spirit of daring or irreverence. Another explanation is that all the myths are but exaggerated biographies of heroes who came to be looked upon long after their death as gods, or at least as demigods—half-gods.

The Greeks and Romans, the Norsemen, the Egyptians and the Hindus are the nations whose mythologies have been most studied. Of these, the first two are the most interesting, and they alone will be treated here in detail, because the Egyptian and Hindu myths are of such a mystic character as to appeal little to any save scholars. In the *Related Subjects,* under the subheads *Egyptian* and *Hindu,* will be found listed the deities who are treated in these volumes.

Myths Regarding the Creation of the World

One of the questions which demanded an answer was that of the beginning of all things. Anything so wonderful as a world could not just happen, these early peoples believed—some strong power must have made it. Their explanations are interesting.

Greek and Roman. Though the Romans had some deities of their own, they adopted most of those of the Greeks, and took over bodily their account of the creation. First of all, said the Greeks, there was just a vast abyss, known as Chaos. From this there rose Love, which created the goddess Gaea (Earth), and from these two came the sky and the mountains, the sea and the animals. Chaos also brought forth two gloomy creatures, Erebus (Darkness) and Nox (Night), and from these, strangely enough, sprang two beautiful beings, light and day. Gaea bore to Uranus (Heaven) twelve children who grew to gigantic stature and were called Titans. Uranus, first ruler of all things, proved very despotic, and at length Saturn, one of the Titans, with the aid of his mother, dethroned Uranus, and made himself king instead. His period of rule, during which everybody and everything on earth was good and happy, was called the Golden Age, but it did not last. For Jupiter, one of Saturn's sons, overthrew him

and made himself supreme head of the universe, allotting to his brother Neptune the sea and to his brother Pluto the underworld, or Hades.

Norse. In the beginning, declare the Norse myths, there was no world, but just a great formless abyss. To the north were mist and darkness; to the south fire and light; and out of the mist world there flowed twelve rivers which emptied into the abyss and were frozen there. Fiery blasts from the fire world melted this ice, and a vapor arose which condensed, came to life, and became the giant Ymir, father of all the giants. From the same source was formed the huge cow, Adhumbla, whose milk fed the giant, while she nourished herself by licking the salt from the ice. As she licked she uncovered first the head, then the whole form of Bori, the first of the gods, from whom all the other gods were descended. Bori's grandsons, Odin, Vili and Ve, fought and slew the wicked Ymir, and from his body they formed the world. His flesh became the dry land, his blood the seas, his skull the overarching heavens, his bones the rocks, his hair the forests, and his scattered brains the clouds. Then light was needed, and the three gods placed in the heavens as sun, moon and stars, sparks from the southern fire world. For a time they were much pleased with their work.

JUPITER

He, whose all-conscious eyes the world behold,
The eternal Thunderer sat, enthroned in gold.
High heaven the footstool of his feet he makes,
And wide beneath him all Olympus shakes.
—HOMER (Pope's translation).

ODIN

Myths Explaining the Making of Man

Greek and Roman. For a time the gods had the earth to themselves, but it was a lonesome place. Then one day the Titan Prometheus, working with the clay of which he was so fond, molded a figure in the image of the gods, and breathed into it life. Very proud of this creature of his skill, Prometheus wanted to bestow upon him some helpful gift, but his brother Epimetheus had used up all the good qualities on the animals. To the tortoise had been given a hard shell, to the hare swiftness, to the fox slyness and cleverness, to the bear strength, to the tiger fierceness; and what remained for man? Prometheus knew of something more valuable than any of these, and visiting the abode of the gods he brought back with him in a tube that wonderful thing, fire. The gods were very angry, and punished Prometheus and the race of men severely. See PROMETHEUS and the STORY OF PANDORA, below.

Norse. One day Odin, with two other gods, was walking near the seashore. They were talking as they walked of the beautiful world they had made, and lamenting that there was no one to enjoy it, for their own home was above the earth. All at once Odin espied two shapely trees, an ash (Ask) and an elm (Embla). "From these," he declared, "I shall make creatures that shall live in this world we have fashioned—bask in its warmth, drink of its waters, force its soil to bear; and they shall give us homage which will be sweet to us." Then of the ash he made a man, of the elm a woman; and from these two sprang all the race of men.

The Myths of Sin and Punishment

These early peoples saw evil all about them, and they were at a loss to account for it. If the gods made the world, and made it good, whence came sin and suffering? They answered the question in various ways.

Greek and Roman. In the Golden Age all men were innocent, but they were not to be allowed to escape the vengeance of the gods because they had learned how to use the most wonderful thing the gods themselves possessed —fire. So Pandora (see below) was sent with her box, and as a result unhappiness spread through the world. Men became greedy and lustful, hating their brothers, and finally the world became so wicked that Jupiter saw that he must sweep it clean of its inhabitants and give it a new, fair start. He caused a great rain to fall and a flood to cover the whole earth, and when it passed only Deucalion and Pyrrha, virtuous servants of the gods, were left. They repeopled the earth by casting over their shoulders the stones which lay on the mountain top about them. Is it not strange and interesting to find, in this mythology of the Greeks, a story so very similar to the Biblical account of the Deluge? It is like meeting, in a far-away land where everything is new, one's next-door neighbor.

Norse. Most of the gods were very good and kindly, but there was one, Loki, who took delight in mischief and wickedness, and it was he, together with the evil giants, who first taught men to sin. They proved apt pupils, and the age of innocence soon passed away, while gods and men had to fight for their very existence with the powers of evil. Some time, the Norse people believed, there should come a dreadful time known as the Twilight of the Gods (Ragnarök), when the evil forces should triumph over the good, and the rule of Odin should come to an end. Out of this destruction, however, a new world was to arise, and innocence and happiness were to prevail again, under the rule of new gods.

The Gods

Greek and Roman. The great gods, according to the Greek poets, had their home on Olympus (which see), where they lived in splendor. Jupiter was their king, and Juno, his sister and wife, their queen; and the others who had the right to live on this mountain top were Minerva, Apollo, Diana, Venus, Mercury, Mars, Vulcan and Vesta. Ceres, a sister of Jupiter, and the goddess of agriculture, had a home on Olympus, but preferred to live on earth, close to her work. There were many, many other deities, some of them, like Cupid, with considerable power, while others had jurisdiction only over the particular stream or tree or mountain which [illegible] their dwelling place. (A detailed knowledge of [illegible] mythology may be gained by reading in these volumes the articles on all the deities named above, and on the other titles listed under *Related Subjects,* subhead *Greek and Roman,* at the end of this article.)

Norse. There were, according to the Norse myths, twelve great gods and twenty-four goddesses, and they had their home in a wonderful region above the earth, called *Asgard* (which see). The rainbow bridge led from Asgard to earth, and the gods crossed it frequently, taking part in the affairs of men. These Norse deities seem to have had far higher morals than those of the Greeks, and the escapades in which they show themselves as licentious and cruel are very few. Besides Odin and Loki, mentioned above, the chief gods and goddesses are Balder, Freya, Frigga, Heimdall, Thor and Tyr, and on most of these there are articles in these volumes.

Illustrative and Explanatory Myths

Illustrative Myths. The whole question of myths may be made far clearer by a number of stories. Some of those which follow are from Greek, some from Norse mythology; some are explanatory myths, while others are of that class known as aesthetic, which make no attempt to explain anything. To each of the nature myths a brief paragraph is added, pointing out the part it had in the "science" of the ancients; but the stories are worth while just as stories, without any such explanation.

Explanatory Myths. The change from summer to winter was one of the common happenings which puzzled the ancient peoples, and very interesting are their explanations of it. The first one, *The Underground Queen,* the Greeks invented; the second, *The Death of Balder,* came from the Norse peoples.

The Underground Queen

Ceres, the goddess of agriculture, was one of the busiest of the deities. In the springtime, she had to go about from field to field all over the earth, attending to the sowing of the seeds; in the summer, she watched the growth of the grains and fruits; and in the autumn, she went about from place to place blessing the harvests. Her car bore her swiftly, and she so loved the helpful work she did that she never grew tired. Still, she was always glad to come back to her home and to her beautiful daughter, Proserpina, whom she loved very dearly.

Like her mother, Proserpina had her duties to perform, though they were not as difficult as those of her mother. She had charge of all the flowers, and in the springtime, when she walked across the meadows, violets and daisies and buttercups sprang up in her footsteps. Naturally, she loved the flowers, and spent much of her time in the fields with her companions tending them and gathering them for wreaths.

One day, as the girls played in the meadows, they heard a strange, rumbling sound and looked up hastily. A huge, dark chariot with dark horses and a handsome, but gloomy-looking, driver was coming toward them. The girls screamed in terror and started to scatter. But the driver stopped his chariot, leaped to the ground, and seizing Proserpina, bore her away with him in his chariot. The frightened girl called to her companions and to her mother, but the black horses carried them on too swiftly for any help to follow her. Meanwhile the stern-looking man explained to Proserpina that he was Pluto, king of all the regions below the earth; that he loved her and wanted her for his wife.

Proserpina answered:

"I must tell my mother; she will be wild with grief when she finds that I am gone and knows not where to look for me."

But Pluto shook his head.

"She would never let you go with me," he declared.

While they were talking thus, they had come to the margin of the River Cyane, which opposed their passage. Angrily, Pluto struck the ground with the great trident which he carried, and the earth opened and made him a passage back to his underground kingdom.

The darkness in which they found themselves after the earth had closed behind them was delightful to Pluto, whose eyes were tired with the glare of the sun; but to Proserpina it was nothing less than horrible. All her life she had been used to living out-of-doors from daylight to dark; and now this was far, far worse than the blackest night she had ever seen.

"You will like it when you become accustomed to it," said Pluto, noticing that the girl trembled as she sat beside him.

Gradually the way grew lighter, though the light was white and ghostly—not like the beautiful golden sunlight of the upper world.

When they came at length to the huge palace of Pluto, he expected Proserpina to exclaim with delight over its gorgeousness; for Pluto owned all the gold and silver and gems that lay hidden in the earth and had made good use of them in decking his palace. But Proserpina was not used to gorgeousness. She and her mother had lived simply always, and the rich gems which she saw about her were less to her than a handful of fragrant flowers would have been. And all the jewel-studded lights, which to her seemed to serve only to make the gloom more noticeable, she would have exchanged for one look at the stars.

It was the same way with the food. All her life she had eaten but the plainest dishes—simple grains, fruits, bread and milk. And the rich food which Pluto ordered to be placed before her seemed so strange to her that she would not even taste it. This went on for several days, Pluto, in great distress, urging her to eat, and she as steadily refusing.

Meanwhile her mother had been almost distracted with fear and grief. The girls with whom Proserpina had been playing could tell her nothing except that a man in a black chariot had carried off her daughter. Who the man was, she could have no idea. She sought day and night through one country after another for her daughter. The sun, when he came through the doors of the East in the morning, saw her wandering on, stopping everyone to inquire for her lost girl; and the evening star found her still at her task. One day, as she sat for a few minutes resting on a stone, an old man with a little girl passed her. The goddess bore about her no signs of her divinity; she looked like a poor, worn-out, old woman, and they took pity on her and begged her to go home with them. At last she consented to do so, and as they walked the old man told her that his little son was very sick of a fever and that he feared to find him dead.

When they reached the house they found that the child had grown rapidly worse, that he was, in fact, almost dead. You may imagine the delight it caused when Ceres, taking the child in her arms, kissed him and thus restored him instantly to health. Then she asked that she might be allowed to take charge of the boy. Of course the family was only too glad to have so excellent a nurse; but the mother, overanxious for the son in whose sudden recovery she could scarcely yet believe, determined to hide and watch what happened; and it was, indeed, a startling sight which she saw.

CERES

Here Ceres' gifts in waving prospect stand,
And nodding tempt the joyful reaper's hand.

Ceres bathed the boy, murmured some magic-sounding words over him, and then, stepping to the hearth, raked a hollow in the glowing coals and laid the boy within it. The watching mother sprang forward with a cry and snatched her child

from what she believed would have been its death. But what was her amazement, when she turned around, to see before her, not the feeble old woman whom her husband had brought home, but the radiant goddess Ceres, with her hair of gold and a wreath of wheat and scarlet poppies. Ceres spoke sadly, but not angrily.

"I would have given to your son," she said, "immortality. Now you, by your failure to trust me, have taken from him that gift."

And with these words, the goddess vanished.

Her search still continued, and finally, when it seemed that everything was in vain, Ceres became angry with the earth which had failed to aid her in her search and laid her curse upon it. Drought and famine, she declared, should extend over the whole earth; nothing green should grow; there should be no seedtime, no harvest, until her daughter should come back to her. In vain the people implored her, in vain tales of their suffering came to her ears; she, usually so gracious and kindly, was cruel enough now.

At length she found a clew. The river Arethusa, which comes up from the underworld, had seen in the kingdom of the underworld a queen who looked, she said, most like Proserpina. She was pale and sad, and the white poppies which she wore in her hair were very different from the bright flowers she had been so fond of wearing. But still, beyond a doubt, thought the river Arethusa, it was Proserpina. Ceres knew not whether to be glad or sorry. Her daughter was found, but found where? She went to the meeting place of the gods on Olympus, which she had not visited since the loss of her daughter, and implored Jupiter to use some means to have her daughter brought to her. All the gods felt sorry for Ceres, and they felt sorry, moreover, for the people on the earth, whom Ceres' grief was causing to suffer. At length Jupiter summoned Mercury, the messenger of the gods, and sent him to the regions of the underworld.

"I will do my best," said the king of gods and men, "but the Fates are even stronger than I, and they have declared that if your daughter has eaten anything while she has been in Pluto's realm she may not again come back to the light of day."

When Mercury reached the kingdom of Pluto and stood before the king and the sad-eyed queen, he himself felt sorry for her and hoped that he should be able to take her back with him. When it became known, however, that Proserpina had eaten a few of the seeds of a pomegranate, Mercury shook his head in despair.

"It cannot be," he said, and he went sadly back to the assembly of the gods, leaving Proserpina more hopeless than before.

At length, however, the Fates agreed to make a decree less severe, and declared that though Proserpina must spend six months of every year with Pluto in the dark, underground kingdom, the remaining six months she might spend with her mother on the earth.

You may imagine the delight of Ceres when it came time for her daughter to return to her for the first time. She stood anxiously at the door of her cottage, waiting, watching while the former companions of Proserpina stood about where they might welcome her. Suddenly there seemed to be a new freshness in the air; the grass in the meadows, long dry, grew green before their eyes, and purple violets and yellow buttercups started up all about them.

"She is come!" they cried, and sure enough, she was advancing toward them across the meadows, her hands outstretched, her garments blowing in the breeze, no longer the sad, white-faced queen of the underworld, but the old glad Proserpina who had left them long before.

Ceres, goddess of agriculture, was one of the kindest of the gods, and she would not, the Greeks felt, afflict her people by withdrawing the warmth of her presence all through the winter months without some good reason. So they made this beautiful tale of the loss of Proserpina. When she descended to the underworld each year, Ceres mourned, and no flowers bloomed and no seeds sprouted—it was winter; but when she returned to the upper world, spring came with all its gladness.

The Death of Balder

Balder the Beautiful was the center of all brightness and cheer in Asgard, home of the gods. Everybody loved him except Loki, who was so wicked that he just could not love anybody that was good and happy. He let himself brood upon his hatred for Balder until in time it came to seem to him that the only thing in life he cared for was to injure Balder. And Balder seemed to feel his danger, for he had most terrible dreams of unknown woe to come, which finally he spoke of to his father and mother, Odin and Frigga, who had questioned him as to his downcast looks.

"Do not fear, my son," said Frigga comfortingly. "I shall visit everything on earth—every beast and bird, every treacherous poison and every lurking disease, every stone and tree and creeping thing, and even the ravening fire—and make them promise not to harm Balder."

Feeling much safer, Balder went home to his shining palace and his beloved wife, Nanna, with his old smile, the light of gods and men, again shining from his eyes.

Frigga's journey about the earth made her mother heart very proud, for every object and living thing on earth took so gladly the oath not to injure Balder.

"Why should we hurt the one whom most we love?" they questioned—"the one without whose presence the earth would be a gloomy place?"

Wearied with her journeyings, but very happy, Frigga went back to Asgard, and just as she was about to enter Valhalla she espied a tiny mistletoe plant on the branches of a strong oak. For an instant she stopped, because she had exacted no promise from the little shrub, but finally she passed on without speaking, thinking the mistletoe was too young and weak to do any harm.

When the gods heard of her success they hit upon a new way of amusing themselves. Balder, with his bright smile quite restored and his golden hair shining in the sun, stood upon their great playground and allowed them to hurl at him their weapons. The sharpest spears, the most jagged stones were thrown with unerring aim, but they harmed Balder no more than a shower of

rose petals. Occasionally some god, with a laugh, would rush upon Balder and strike him with a battle-ax, but the charmed god felt no touch of the ax.

But there was one god who had had no invitation to this sport—Loki; and when he passed by and saw it he was furiously angry. Did all things then love Balder? He hastily made a crafty plan, and disguising himself as a poor old woman, went to Frigga's palace.

"Mother of the gods," said this old woman, "your son Balder will be killed, for the gods are hurling at him their sharpest darts."

"Ah," said the happy mother, "they cannot harm him, for all things in heaven and earth have taken an oath not to injure him."

"Marvelous!" said the visitor. "You must be a proud mother to have such honor shown your son. Did you really mean everything?"

"Yes," answered Frigga. "O no," she added carelessly, "I did not trouble to ask the little shrub on the oak eastward of Valhalla—it could do no one any harm."

With more flattering words Loki slipped away, resuming his own shape when out of sight of Frigga. To the Valhalla oak he hastened, cut off the mistletoe, now grown larger and stronger, and from it fashioned a dart. Then he joined the other gods at the sporting ground, and found them none too glad to see him. He approached Hoder, Balder's blind brother, who stood apart, with no weapon in his hand, and asked him why he did not join in the game.

"Gladly would I do honor to Balder," said Hoder, "but I cannot tell in which direction to throw, nor have I anything to hurl."

"That I can remedy," said Loki. "I will direct your aim, and I will give you the dart which I have in my hand."

Gladly Hoder agreed, and under Loki's guidance threw the mistletoe dart, but instead of falling harmless at Balder's feet it pierced him through and through, and he fell down dead. For a moment there was a horror-stricken silence, then a wail of anguish went up, and the gods rushed toward Hoder and demanded his life. But Heimdall, wisest of the gods, persuaded them that it was not the fault of the blind Hoder, whose grief was great, but of the treacherous Loki, who had now vanished, and he induced them to turn from thoughts of vengeance to plans for bringing Balder back.

Then Hermod, called the Nimble, mounted Odin's eight-footed steed Sleipnir, and rode away to the abode of Hela, goddess of the dead, to plead for Balder's return. It was a long and toilsome journey, through dreadful caverns, cold and dark, but at last he came to Hela's realm and made his plea; but the dark goddess was the daughter of Loki and remained unmoved at the tales of the grief in Asgard.

"Let us see," she said coldly, "whether it is true that everything loved and mourns for him. If all things in the world, whether they have life or no, weep for him, he shall go back, but if one person or one thing refuse to weep, here he shall stay."

Somewhat cheered, Hermod rode back to Asgard and told this tale, and messengers were sent out through all the world to beg everything to weep for Balder. Only success greeted them for some time, but at length they found an old hag sitting at the mouth of a cave, and she only mocked them when they made their request.

"With dry tears will I weep," she scoffed. "Hela shall keep her prey."

"It is Loki in disguise," they whispered as they made their way sorrowfully back to Asgard, where they told the weeping gods that Balder should return no more.

Then they carried the beautiful body of Balder to the seashore and laid it upon his great ship, whereon had been raised a funeral pile. Each god cast into the pile his chief treasure, and then the fire was applied. At the last moment Balder's wife Nanna hurled herself upon the pile, because she could not live without her husband. All ablaze, the ship, with its sails set, was launched for the open sea, and silently the gods stood and watched it as it drifted on and on, burning ever higher and higher. And when the night was almost gone the flame, now far distant, flickered out, and the gods knew that Balder was gone from them forever.

In this myth Balder, the bright and beautiful, represents the summer, all too fleeting in the northern lands; while Hoder, blind and grim, is the winter with its bitter strength. And the death of Balder is of course the slaying of the summer by the winter's cold.

The Greeks had another weather myth which must have been the delight of children in those early days. It is as follows:

The Story of Phaethon

When the boys with whom Phaethon played about the fields and river banks boasted of their fathers, Phaethon was silent. His mother, he knew, was more beautiful than the mothers of his friends; his grandfather was a wealthy, honored man; but his father—he knew nothing whatever about a father. This was bad enough, but when his playmates began to see that such was the fact, they made him suffer constantly.

"No one can play in this game unless he can tell who his father is," one would cry mischievously.

"Let's spend our time telling about the greatest deeds our fathers ever did," another would suggest.

And Phaethon, ashamed and angry, would rush home to his mother and pour out his wrath and shame.

"Some day, Phaethon," she would assure him, "you shall know about your father, and then none of the other boys will dare to taunt you."

"But I want to know now!" Phaethon would insist, stamping his foot.

"You are too young yet, my son," Clymene would reply, looking sadly at her son.

At length one day when Phaethon had grown to be a tall, handsome lad, he came into the house in a fiercer state of anger than usual.

"I will endure this no longer!" he cried. "Either I shall be able to tell those insulting boys tomorrow who my father is, or I shall never look them in the face again."

Clymene smiled. "Come here, Phaethon," she said, "and let me whisper something in your ear."

What he heard made the boy look, first, astonished, then delighted; and he rushed out-of-doors and back to the place where he had left his comrades, radiant with joy.

"*Now* let's tell tales of the deeds of our fathers!" he cried.

And the other boys looked at him in surprise.

"But you have no father," one of them declared.

"O haven't I!" replied Phaethon, no longer angered by the taunt which had so many times stung him. "You see him every day when he drives his chariot across the highest part of the heavens. He is Apollo, the sun god."

A burst of laughter greeted this proud statement.

"Oho!" cried one boy. "Why could you not have made up that story some years ago and saved yourself a great deal of embarrassment?"

"Do you actually expect us to believe that?" asked another, with a sneer.

Disappointed, angry, Phaethon turned again toward home. Having a father was as bad as not having one, if you could not convince other people of his existence.

But his mother was ready to help him out of this difficulty. Looking at him proudly, she said:

"No father would be ashamed to acknowledge you as his son. Tomorrow morning you may go to Apollo, and ask him whether what I have told you is not the truth."

The impatient boy could scarcely wait for the morning to come, and long before daybreak, while the stars and moon were still to be seen in the sky, he started off toward the East, traveling as rapidly as he could. At last he came to the gorgeous palace of the Sun and was admitted within the doors to the very throne-room of his father. There, on the diamond-studded throne, sat the radiant god, wearing a purple robe and bearing on his head the crown of beams.

"Who are you," he asked, "who have come here to my palace? It is almost time for me to set out on my day's journey and I have not long to talk with you."

Impulsively Phaethon poured out the story of his wrongs, and ended with a plea that his father would give him some sign by which he might convince his skeptical comrades. Apollo laid aside the beams from about his head, which were so dazzling that the youth could not approach closely, and called the boy to him.

"To be sure you are my son," he declared, "a son whom any father might be proud to own. I am willing to give you any proof of the fact, and I swear by the River Styx (and that is an oath which even the strongest of the gods would not dare to break) that I will grant you any wish which you may ask of me."

This was precisely what Phaethon had hoped for, but had hardly dared to expect, and it did not take him long to give his answer.

"There is one thing," he declared, "which will really be a proof. Let me drive for one day your great chariot across the sky; then no one who sees me can doubt that I am your son."

Now Apollo was very sorry for the rash promise which he had made.

"Choose something else, my son," he begged; "what you have asked for is not safe. You can have no idea of the dangers of the path across the heavens. The road at the beginning of the journey slopes upward so steeply that even my horses can hardly climb it; the middle of the road is so high above the earth that even I, myself, become dizzy when I look down; and the last part of the road slopes downward so rapidly that it is almost impossible to hold in the horses. If it is hard for me, think what it would be for you."

But Phaethon refused to think. He had set his heart on this one thing and this one thing he would have. He knew his father could not break the oath which he had sworn by the River Styx, so he persisted in his demand. At last, attended by the Seasons, the Days, the Months, the Years, and the Hours, Apollo led the way to where the sun chariot stood waiting. It was the most gorgeous chariot that Phaethon had ever looked upon—of gold and silver and precious gems—and his heart beat proudly that he was actually to have the guiding of the magnificent car for a whole day. The horses were led forth and fastened to the chariot, and Aurora, the goddess of dawn, threw open the doors of the East, through which the sun in its splendor was presently to rise. After a final plea, which Phaethon stubbornly resisted, Apollo anointed the boy's head with ointment so that he might not be scorched by the brightness of the beams, and then set the crown of rays on the young head.

"Remember, my son," he said, "do not drive too high or too low; a middle course is best. Above all, do not attempt to use the whip, for the horses are spirited; and hold tight to the reins."

Only half heeding his father's instructions, Phaethon sprang into the chariot, grasped the reins, and shaking them over his steeds, started out through the open door.

It did not take the horses long to feel that it was an unpracticed hand that grasped the reins, and, taking the bits in their teeth, they dashed out of the traveled road and wildly up the heavens. The courage with which Phaethon had

PHAETHON'S RIDE

"Up, up, up, went the horses, and then as suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge."

started out did not last long. Below him—a dizzying, sickening distance below—was the earth and the sea. What if he should drop from this awful height! And there, when he looked about him in the heavens, were even worse sights; the Big Bear and the Little Bear, the Scorpion and the Lion, the huge Crab—all of these seemed to be reaching out toward him as he dashed among them. Up, up, up, went the horses, and then as

suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge. They came so close to the earth that mountains which for thousands of years had been snow-crowned lost their snow-caps and stood bare and brown; rivers were dried up; a great part of Africa was burned to a desert; and many of the people were scorched almost black.

Phaethon had long before this dropped the reins, and he stood shaking with terror. Cries came up to him from the earth, cries of pain and terror and fright from the people of the countries over which he was passing. But he was too much afraid for his own safety to worry about others.

The cries did, however, reach the ears of Jupiter, the king of the earth and heavens, where he sat on his throne on Olympus, and he, horrified, looked out upon the course of the wild boy. The other gods and goddesses gathered about him and besought him to save the earth.

"There will be no beauty, no freshness left," they cried. "There will be no cool springs and lakes for the nymphs to live in; no great trees and forests where dryads may shelter themselves."

"I call you all to witness! There is no other way to save the earth but this!" cried Jupiter, and he raised his arm and hurled a bolt of lightning at the luckless Phaethon.

Struck from the chariot, the boy fell headlong into a great river, while the horses trotted quietly across the remaining part of their course and disappeared into the doors of the West.

This is but a dramatic way of telling about the droughts of summer and the suffering caused to men and to plants by them, while the lightning which Jupiter hurled to end Phaeton's reckless drive represented the thunder shower by which a drought is often broken.

Some myths have in them but a touch of the nature element, so slight that it is hardly safe to say that it is there. The tale of Arachne, from which comes *Arachnida,* the scientific name for the spider family, is given below, and is one of these myths. It is easy enough to fancy that some Greek, watching a spider spin and spin, and spin, may have thought, "Could there be any worse punishment than that endless carrying on of an endless task?" And then perhaps there came to him the idea that maybe it was a punishment, and he made some such story as this:

The Story of Arachne

Arachne had many things of which she might have been very proud; she was young, beautiful, and had many friends. But she cared less for any of these things than she did for the fact that she was a very skilful weaver. People came from all the country near her home to see the beautiful patterns which she wove on her loom; and as they watched the web grow under her fingers they would exclaim:

"Surely Minerva herself must have taught you; in no other way could you have learned to do such wonderful work."

Most girls would have been proud to have been taken for a pupil of the wisest and most skilful of the goddesses, but Arachne was so proud that she could not bear to have people think that even Minerva ever could have taught her anything. Finally her boasts came to the ears of Minerva herself. Now Minerva was not naturally cruel or revengeful, but there was a wickedness in any mortal's setting herself up to surpass a deity which even Minerva could not pardon. Determined, however, to give the boastful girl a chance, Minerva took the form of an old woman and went to Arachne's home.

ARACHNE

She filled her web with subjects designedly chosen to exhibit the failings and errors of the gods.

"Foolish girl," she said, "how do you dare to set yourself up as an equal in skill to the goddess of the arts? Do you not know that she could punish you severely for such boasting?"

"Let her!" said Arachne. "I am her equal, and I am willing that she should know what I have said. Let her come and match her skill with mine—and if I am beaten I will pay the penalty."

"Foolish girl!" cried the goddess, dropping her disguise and appearing in her own radiant form; "the trial shall take place here and now."

All those who stood by were terrified; some of them fell at the feet of Minerva; others besought Arachne to yield before it was too late. But the proud girl remained defiant, unafraid.

So the contest began, while the bystanders stood breathless with fear and admiration. Minerva at her loom worked rapidly, the shuttle seeming to fly as she passed it back and forth through the threads; and a marvelously beautiful pattern soon began to show itself in the web. But Arachne's web seemed, to those who watched, little, if any, less perfect than that of the goddess herself. Only, what was this which the reckless girl was daring to do? Not content with defying one of the gods, she chose for her subject in the web she was making the faults and failings of the dwellers on Olympus, showing them so clearly that nobody could mistake.

Her own web finished, Minerva turned and looked at Arachne's. It was wonderful—the goddess could not but admit it to herself. But the presumption! the wickedness of it! thus to hold up the faults of the gods before these staring people.

With her shuttle she tore the beautiful web of Arachne from top to bottom, and then turned to the girl herself.

"Your sin merits death," exclaimed the angry goddess, "but death shall not be your portion. Since, however, you have been so fond of weaving, your punishment shall be, that forever and forever you and your descendants shall make your threads and weave your webs. And wherever men see you they shall tear your webs as I have torn this, and shall drive you from them as I drive you from me now."

And touching the girl upon the forehead, she transformed her into a spider.

But all the explanatory myths did not deal with nature problems; some were answers to moral questions, and one of the most interesting is that which tells of the coming of sin into the world. Men had become as the gods, since they had the fire given them by Prometheus, and they must be punished for their presumption. The Greeks told of their punishment thus:

The Locked Box: The Story of Pandora

In all the beautiful world there were no women —only men, who lived in a state of utter ease. The food which they needed grew ready to their hand on the trees and shrubs; the air was full of the fragrance of flowers, and there was nothing to do all day but to enjoy themselves and exercise their perfect bodies, which had never known a touch of any disease. But the gods in council decided that a vexatious punishment should be sent to man, and that that punishment should be *woman*. Accordingly, they ordered the artist-god Vulcan to make one. Very beautiful she was, and the gods took delight in bestowing upon her wonderful gifts. Apollo made her musical, Mercury gave her powers of persuasion, Venus made her lovable, and in the end they called her *Pandora*, the *all-gifted*.

Mercury, the messenger-god, was commissioned to take the maiden to earth, and to leave her with Epimetheus, brother of Prometheus; and with her was sent a curious box, about the contents of which no word was said. Epimetheus received her gladly—never had he seen so exquisite and so alluring a creature; and all his friends rejoiced in his good fortune, for envy as yet had not entered the world. The songs of Pandora Epimetheus and his friends found more beautiful than the songs of the birds, and they loved to gather about her when the purple twilight was falling and listen to the tales she invented for them.

For a time Pandora was very happy. The world was new and very wonderful, and every day there were countless things to learn. She found out about the mysteries of fire, which looked like a great wind-tossed flower but was so powerful; about the delightful warmth of the day and the delightful cool of the night; about the tastes of the various fruits, all so delicious but all so different. But in the back of her mind there was one persistent, nagging little trouble that grew larger and larger and threatened to spoil all her pleasure. For Mercury had forbidden her, with the sternest words and the severest look, to open the box he had left with Epimetheus, so there was one thing in the world that she could not find out about. And she wanted to know—O, how she wanted to know!

"Probably," she thought, "there are lovely things in the box which would make me even more beautiful—white robes like Juno's, or a golden girdle like that which Venus wears."

Day after day she fretted, and Epimetheus felt the first sadness he had ever known creep over him as he saw Pandora's sadness. Finally she told him what was troubling her, and besought him to open the box; for there was the golden key hanging by a golden cord. But Epimetheus was horrified.

"Do that which the gods have forbidden?" he cried. "Never! The box shall stand in my house forever, and I shall never open it," and he went back to his companions, leaving Pandora to indulge her curiosity alone.

For a time Pandora resisted, but one day when she was left alone in the house the temptation became too strong for her. She slipped the key into the lock, turned it slowly, still but half intending to open it, and then, suddenly, threw

PANDORA

Hope sole remain'd within, nor took her flight.
—HESIOD (Elton's translation).

back the cover. No beautiful glitter met her eyes, but only a throng of winged pests which buzzed out at her and hurt her with their sharp stings. There was disease in many forms—fever and cholera and rheumatism; there were spite and envy and green-eyed jealousy; there were black worries and gray despairs. She had loosed the ills which were ever after to plague the earth.

In a cloud they swept through the door and windows, darkening the sun, and soon Epimetheus and his companions, at play on a distant green, heard their angry buzzing and felt their stings. And at once dissensions sprang up, and angry words rushed from lips which till now had known only loving ones. Comrade turned upon comrade, and each saw in the other's face his own scowl reflected. The age of innocence had gone, never to return.

Meanwhile at home Pandora sat dismayed. She had slammed down the lid of the box, but too late to shut within it any of the buzzing throng. At length she heard a tiny tapping on the lid, and a tiny voice that said "Let me out! Let me out!"

"No!" she cried. "If there is one of you in there, you shall stay."

But still the tapping and the pleading kept up, and finally Pandora, whose curiosity was not all dead, opened the lid ever so little and peeped in. And there was the most beautiful creature with white wings, which flew merrily out into the light.

"I am Hope, I am Hope," it sang, and it seemed to Pandora that the world grew brighter with its song. Away it flew to the quarreling Epimetheus and his friends, and at its approach the buzzing troubles and wickednesses took their flight, and peace came again. Not the same peace—the peace of innocence had gone forever; but while there was Hope in the world, those men who for the first time had tasted sorrow and anger realized that no troubles would be too bad to be borne.

Aesthetic Myths

The ancients had no novels, no short stories such as make up so large a proportion of the reading matter of to-day, but they did have their myths which must have answered just the same purpose. These aesthetic myths seem to have had no teaching purpose, either moral or intellectual, save as any good story teaches its own lesson. The first that follows here is one which the Norse children must have listened to with delight but with shudders; while the second was probably a favorite with the young people in the sunny land of Greece.

The Fenris Wolf

Nothing proved more clearly that Loki was not fit for the company of the gods than the fact that he wandered off to the home of the giants and there married the fiercest giantess of all, Angerbode. Naturally enough, the children she bore him were not sweet and beautiful, but surely even from her Loki could not have expected such offspring. First of all there was the gloomy daughter Hela, a very strange person to look upon; for she was half blue and half white, and in her deep eyes there was a look of such unconquerable sadness that no one who looked upon her ever smiled again. But the other two children were much, much worse. One was a great slimy serpent, with vicious poison fangs, the other a huge wolf with glaring eyes and teeth as sharp as swords. Loki himself was not afraid of his children, but the other gods looked down from Asgard in dismay, for the monsters grew as much in an hour as any ordinary creature would grow in a year.

"Something must be done," pondered Odin, king of the gods, "for soon we shall not be safe on our thrones from the hatred I see burning in their eyes."

So he sent Thor to bring them to Asgard before they became too large and strong for even this most powerful of the gods to manage, and all the gods gathered in council discussing their fate. First Odin turned to Hela.

"You are not vicious," he said, "but the death in your eyes makes it unsafe to leave you on earth among men, and you shall be sent to reign over the underworld—the vast kingdom of the dead."

Without a word Hela turned and left the council hall. There was no happiness in the world, anyway, and even the world of the dead—of those who had met inglorious death in their beds instead of dying bravely on the battlefield—could add nothing to her sadness.

Then Odin turned to the serpent, and though it could understand very well the language of the gods he said no word to it, but seized it in his arms and threw it over the wall that encircled Asgard. At length to the ears of the listening gods there came a great splash, which meant that the serpent had fallen into the sea. There it grew and grew to such an enormous size that it stretched about the whole earth, holding its tail in its mouth.

But there still remained the Fenris wolf, the most troublesome of the three.

"Let us kill him," whispered one on Odin's right hand.

"Not so," replied Odin, "for we have one and all sworn that no blood shall be spilled in the beautiful city of the gods. Let us see whether by kindness we cannot tame him."

So the wolf was turned loose to prowl about the streets of Asgard, and the night was often made hideous by his howls. As he grew rapidly larger he grew fiercer, also, and only the war god Tyr, the bravest of all the gods, dared go near enough to him to feed him.

"This cannot go on," said Odin one day in council. "Son Thor, can you not make in your smithy a chain heavy enough to bind him?"

"I shall make a chain which I myself cannot break," said Thor, "and I am very strong." Away he hurried to his smithy, and before long they heard his fire roaring, and his hammer clanging on his anvil. The next morning he showed his chain proudly, and told of his crafty plan for binding the wolf.

"Come, Fenris," he called, "let us play a game. This chain is so strong that not all of us can break it, but if you will allow us to bind you with it you can prove how much stronger you are than the gods."

Growling and glaring, the wolf drew near and let them bind him, and very tight they drew the chain. But without the least effort the wolf rose, shook himself, and threw off the broken, clanking chain. The gods were dismayed, all save Thor, who vowed that he would make a chain that could not be broken.

In the morning, after the gods had listened all night to the beats of his hammer, he appeared among them with a chain which he declared was the strongest that could possibly be forged. Again they proposed the same test to the wolf, and again he submitted, knowing his own strength too well

to fear. The gods held their breath for a moment, hoping—hoping; but one shrug of the great, hairy shoulders, one stretch of the powerful limbs, and the wolf stood free.

Then Odin, almost despairing, sent a messenger to the dwarfs, those wonderful workmen who have their smithy underground, and who have at their disposal all the riches of the world. And they, at the bidding of the gods, fashioned a most marvelous chain, which was made not of iron, but of the noise of a cat's footfall, the roots of stones, the spittle of birds, the beards of women and the nerves of bears. Very soft and fine it looked—no stronger than a silken cord; but the dwarfs had guaranteed their work.

The gods thought they would have no trouble with Fenris this time, and called him joyously, but he suspected their scheme.

"You shall not bind me with that," he growled. "If it is really but a frail string you would find no pleasure in binding me with it; if it is enchanted, I can never break it."

In vain they urged him, insisting that it was but a game; he knew that they feared and hated him, and shook his shaggy head. Finally he said mockingly:

"Very well, if it's a game, you may play at it too. If one of you will put his hand into my mouth, you may wrap me with the cord as securely as you will."

The gods dared not show their dismay, for that would be equivalent to confessing their craftiness, so the brave Tyr stepped forward and thrust his hand between the awful jaws. Then Fenris lay quiet, while they wrapped him securely with the cord.

"Now!" said Thor, and the wolf tried to rise. He twisted and struggled, but in vain, for the magic cord but drew the tighter and the blood ran from his body. When he saw that the gods made no effort to release him he snapped off Tyr's hand, and from that time on the great god of battles was one-handed. It was a heavy price to pay, but not too heavy, Tyr felt, for it had saved the gods from their worst enemy. Fenris roared and growled and shook the ground with his struggles, but the dwarfs' masterpiece held firm, and again the gods might go about their city without fear of the dreadful fangs at their heels.

The story which follows is one of the most pleasing of all that have come down from the old Greek myths.

The Story of Atalanta

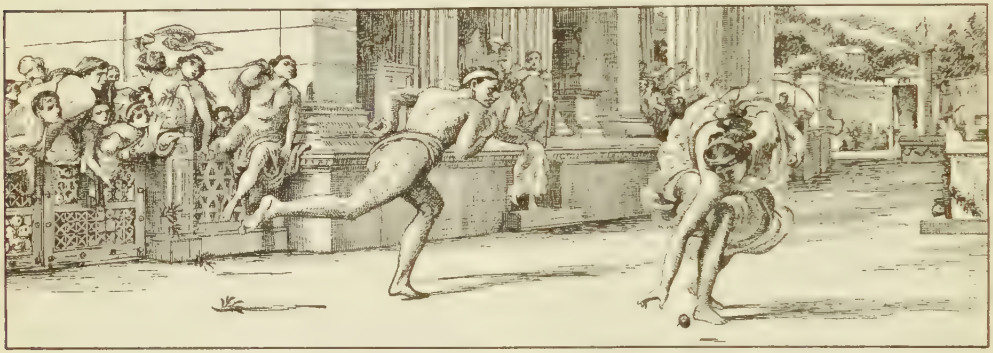
The king of Boeotia had one daughter, Atalanta. While she was more beautiful than any other girl in her father's kingdom, she remained a maiden at home in her father's house, long after all her companions were married. And this was not because she lacked suitors. Young men, handsome, strong, rich, fearless, came constantly to her father's palace, seeking her in marriage, and it was not because the king refused his consent that they went away unhappy.

Atalanta herself was the cause of their unhappiness, for she had made a vow that she would not marry, but would devote her life to the chase, like the goddess Diana, whom she so much admired. It was hard, however, to be constantly refusing without having any good reason that was apparent, so she made up her mind to give a different answer to her suitors—an answer which would leave them no argument. Accordingly, when the next youth presented himself, she replied:

"I shall marry the man who can defeat me in a race; but everyone who tries and fails shall be put to death."

This may sound as if Atalanta was a very cruel princess, but her idea was simply to keep people from bothering her with the question of marriage. However, her resolution did not have the effect she expected, for there were still found young men who were anxious enough to have the princess for a wife to submit to the trial which she proposed.

Now, Atalanta could run as swiftly as the deer she hunted in the forests, and however much a youth might pride himself on his speed, he was certain to find it was no match for hers. A number of suitors had met their deaths by reason of their love for her, and the people of her father's kingdom were beginning to murmur among themselves at her cruelty. One day there acted as judge in one of the races a youth, Hippomenes, by name, who had never before seen Atalanta. As he took his place in the judge's



ATALANTA'S RACE *From painting by Poynter.*

Hippomenes turns her astray
By the golden illusions he flings on her way.
—MOORE.

seat, he said to himself, looking around at the crowd which had gathered to witness the race:

"How can any man be so foolish as to risk his life for the sake of this one girl when there are so many beautiful girls to choose from?"

But when he saw Atalanta step forward, ready for the race, he changed his mind; for never, he felt sure, had he looked upon anything so beautiful, and he found himself hoping that the youths who ran with her would be defeated.

And as she ran she looked even more beautiful. Her bright hair blew backward in the breeze, a lovely color flushed her face and her gracefulness in running was wonderful to look upon. Of course she won, as she always did, and the youths who had made trial of their skill with hers were mercilessly put to death. Even this, however, did not frighten Hippomenes.

"What glory," he said to her, "can there be in defeating weaklings like those who just ran with you? Tomorrow, if you will, I shall try my speed and endurance against yours."

As Atalanta looked at him, she felt that she would scarcely wish to defeat this young man, so handsome did he look, so brave, so worthy to be her partner. Still she only nodded her head and made up her mind that she would give him as hard a trial as she had given the others.

Now, Hippomenes knew, having seen her run, that he could never hope to conquer her in a fair race, but he thought:

"There are ways in which it can be managed. Every girl is curious, every girl likes beautiful things."

Accordingly, the next day when he took his place beside Atalanta in the starting line, he had in the front of his robe three beautiful golden apples. As the signal for starting was given, the two sped forward, side by side. For a moment it seemed as if he would actually outrun her, but with a fleet step she passed him. Instantly he seized one of his golden apples and tossed it a little ahead of her. She caught her breath, almost stopped, but her desire to win was strong; however, the beautiful golden sphere looked so tempting that she hastily stooped to grasp it. Running with all his might, Hippomenes threw a second apple, and again Atalanta slacked her speed and seized it, yet kept fairly ahead of her fellow contestant. Almost despairing, Hippomenes tossed slightly to one side of the course the third apple, the largest, ruddiest, most beautiful one of all.

This was too much for the princess. She stopped suddenly, her draperies whirling about her, stooped, and seized the apple. The delay was but for a second, although longer than on the two previous occasions, but that was all Hippomenes needed. He passed her, and with a final rush, reached forward, and touched the maple goal. He had won! and the cheers of the people told that they were glad that at last their beautiful, haughty princess had been conquered.

And as Atalanta came toward Hippomenes and held out the hand in which lay the beautiful golden apples, all could see that she looked far more happy in her defeat than she had ever looked before in all her victories. F.J.C.

Consult Gayley's *Classic Myths;* Guerber's *Myths of Greece and Rome;* Keary's *The Dawn of History: An Introduction to Prehistoric Study* (new edition); Fiske's *Myths and Myth Makers.*

Related Subjects. For specific information on mythological subjects, the reader is referred to the following articles in these volumes:

EGYPTIAN

Ammon
Apis
Athor
Isis
Osiris
Re
Serapis

GREEK AND ROMAN

Achates
Achilles
Actaeon
Adonis
Aegis
Aeneas
Aeolus
Aesculapius
Agamemnon
Ajax
Alcestis
Amazons
Ambrosia
Andromache
Andromeda
Antigone
Aphrodite
Apollo
Apple of Discord
Arachne
Arethusa
Argonauts
Argus
Ariadne
Atalanta
Atlantis
Atlas
Aurora
Bacchus
Baucis and Philemon
Bellerophon
Boreas
Cadmus
Calliope
Calypso
Cassandra
Castor and Pollux
Cecrops
Centaur
Cerberus
Ceres
Charon
Chimaera
Chiron
Circe
Clytemnestra
Cupid
Cyclops
Daedalus
Daphne
Deucalion
Diana
Dryads
Echo
Egeria
Elysium
Endymion
Erebus
Eris
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Fates
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Galatea
Ganymede
Golden Fleece
Gorgons
Graces, The Three
Hades
Harpies
Hebe
Hecate
Hector
Hecuba
Helen of Troy
Helios
Hercules
Hero
Hesperides
Hydra
Hygeia
Hymen
Hyperion
Io
Iphigenia
Iris
Ixion
Janus
Jason
Juno
Jupiter
Laocoön
Lares and Penates
Lethe
Luna
Mars
Medea
Medusa
Menelaus
Mentor
Mercury
Midas
Minerva
Minos
Minotaur
Muses
Naiads
Narcissus
Nectar
Nemesis
Neptune
Nereids
Nereus

Nestor
Nike Apteros, Temple of
Niobe
Nymphs
Oedipus
Olympus
Orestes
Orion
Orpheus
Palladium
Pan
Pandora
Paris
Pegasus
Pelops
Penelope
Perseus
Phaedra
Phaethon
Philomela
Pluto
Plutus
Polyphemus
Pomona
Priam
Prometheus
Proserpina
Protesilaus
Proteus
Psyche
Pygmalion
Python
Rhadamanthus
Rhea
Saturn
Satyrs
Scylla
Semele
Sibyl
Silenus
Sirens
Sisyphus
Somnus
Sphinx
Styx
Tantalus
Tartarus
Terpsichore
Theseus
Thetis
Titans
Ulysses
Urania
Uranus
Venus
Vesta
Vulcan
Wooden Horse

HINDU

Brahma
Siva
Vishnu

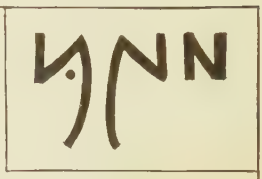
NORSE

Asgard
Balder
Frey
Freyja
Frigga
Heimdall
Hel
Lok
Niflheim
Norns
Odin
Sigurd
Thor
Valhalla
Valkyrie
Yggdrasil

GENERAL

Brownie
Fairies
Genii
Giants
Gnomes
Lorelei
Mermaid and Merman
Nix
Phoenix
Puck
Pygmies
Roc
Unicorn

Nn



N is the fourteenth letter of the English alphabet. Like *m*, it has come with little change of form or value from the Phoenician alphabet, though in the course of the change in the direction of writing to the present left to right method the letter has been turned around. The Phoenician name of the letter was *nun*, which meant *fish*, and some scholars have succeeded in seeing in the original form a crude sketch of a fish's head with open mouth. The resemblance, however, is far from striking.

The sound of the letter in English is simple and unvarying. It is a nasal, by far the most common of all the nasal sounds, but is also classed as a liquid or semivowel. In combination with *g* it forms a nasal, as in *sing*, the *g* serving merely to modify the *n* and not being pronounced itself. In a few words, *n* is silent, as in *hymn*.

NABOPOLASSAR, *nab o po las' ar,* a Babylonian king from 625 to 605 B. C., the founder of the new Babylonian empire. His parents were not members of the ruling class, so his rise to sovereignty was by means of his own efforts. At first he was a vassal king, but through a revolt gained power over the practically independent district of Chaldea. Later, in 606 B. C., with the aid of the Medes and Scythians, he destroyed the Assyrian empire through the fall of Nineveh, thus making his the supreme authority in the Euphrates valley. Nebuchadnezzar, his son, succeeded him, receiving a prosperous and extensive empire. By means of a canal Nabopolassar brought the waters of the Euphrates River to the city, enlarged the Babylonian temple, Marduk, and greatly beautified the city—in all showing himself a man of energy and power. See ASSYRIA.

NADIR, *na' der,* the point of the heavens directly opposed to the zenith, the latter being the point directly over our heads. The zenith and the nadir are the two poles of the horizon; the zenith, nadir and center of the earth are therefore in one straight line. The word is frequently used to describe the lowest depression of spirits, or the lowest point of a career. Hawthorne, in his *Blithedale Romance,* uses the terms *nadir* and *zenith* to point a contrast, as follows:

> The two theories differed as widely as the zenith and the nadir.

This is a comparison which is used frequently in speech and in writing.

NAGASAKI, *nah ga sah' ke,* one of the principal cities of Japan, a seaport lying on a peninsula on the northwestern coast of the island of Kiushiu. Its harbor, one of the most beautiful in the world and one of the safest in the Eastern hemisphere, is about three miles long and six miles wide. Nagasaki is the first port of entry for vessels approaching Japan from the south and west, and it has the largest dock in the empire. This was built in 1879 with the expectation of promoting trade; it is 460 feet long, eighty-nine feet broad and twenty-eight feet deep. The city figures largely in the shipbuilding industry, and is an important coaling station. Previous to 1858 Nagasaki was the only Japanese port having communication with Europe. The houses are not particularly attractive, but the streets are clean and well paved. On the hills behind the town are various Buddhist temples. The chief exports are

rice, coal, camphor, tobacco and flour. Population, 1920, 176,554.

NAGOYA, *nah go' ya,* the capital of the province of Owari, Japan, best known as one of the great centers of the pottery trade. The city is situated near the head of Isenumi Bay, on the island of Hondo, 235 miles from Tokyo and ninety-four miles from Kioto. The first glazed pottery produced in Japan was made in the thirteenth century by Kato Shirozaemon, at Seto, thirteen miles from Nagoya, and all the products of the great potteries of the former city are taken to Nagoya to be sold or for export. Nearly the entire population is engaged in the pottery industry, and the city has also large cotton, silk and embroidery factories. In this city originated the Japanese system of enameling known as *cloisonné.* The most important of the buildings is the castle of Nagoya, erected in 1610, and now used as a military depot. Population in 1920, 429,990.

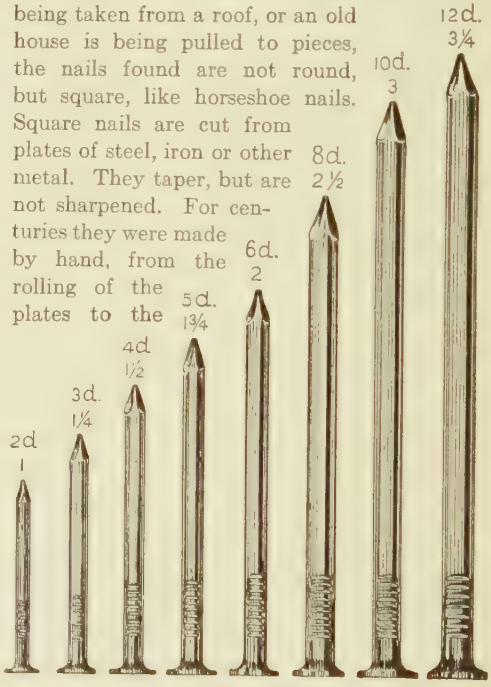
NA'HUM, the seventh of the twelve minor prophets of the Jews. Nothing is known of his life or personality excepting that he was an *Elkoshite,* and no one knows where or what Elkosh was. In the book of the Old Testament which bears his name, Nahum foretells the fall of Nineveh and in striking and fanciful terms prophesies its utter destruction and ruin. He compares Nineveh to Egyptian Thebes *(No-Amon),* which had evidently just been destroyed, thus fixing the date of his prophecy around 606 B. C.

NAIADS, *na' yadz,* or *ni' adz.* As the dryads, in classical mythology, presided over trees and woods, so the naiads were the special divinities of springs, fountains, brooks and rivers. They were greatly venerated, and goats and lambs were sacrificed to them; milk, fruit and flowers were offered to them, and oil, honey and wine were poured out as libations.

NAILS, parts of the outer skin, or epidermis, especially developed to afford protection or to provide weapons of offense and defense. Claws and hoofs of animals are forms of nails, as are the long talons of such birds as the eagle. In some instances the nail constitutes nearly the entire foot, as the hoof of the horse. The chemical composition of nail is the same as that of horn, which is made up of carbon, hydrogen, oxygen, nitrogen and sulphur.

The nails of man appear on the upper surface of the ends of the fingers and toes, and serve as protective coverings. The skin below the nail, from which it grows, is called the *matrix.* Near the root of the nail the cells are smaller and carry less blood; the white, crescent-shaped spot which they cause is called the *lunula* (from *luna,* meaning *moon*). If a nail is torn off it will grow again, provided the matrix has not been severely injured. The state of health is often clearly indicated by the nails, the presence of fine grooves across them being a sign of physical weakness. Doctors find a study of the nails a help in the diagnosis of certain diseases.

NAILS, *naylz.* Of the billions of nails made in America every year nearly all are cut from steel wire, yet it was not until the last quarter of the nineteenth century that the wire nail, or French nail, as it was at first called, became popular. When old shingles are being taken from a roof, or an old house is being pulled to pieces, the nails found are not round, but square, like horseshoe nails. Square nails are cut from plates of steel, iron or other metal. They taper, but are not sharpened. For centuries they were made by hand, from the rolling of the plates to the



WIRE NAILS

The numbers refer to the length of the nails in inches; *d* means *penny.* Actual lengths are pictured.

hammering which flattens the heads; but in 1786 a machine for doing most of the work was patented in the United States. A century later the wire nail was beginning to be accepted as a substitute for the cut nail, and as it is much cheaper to manufacture, it has rapidly displaced the older style. The wire nail may be bent and does not break as easily as the ordinary cut nail, but the latter holds better and is more durable. A specially-forged cut nail is used in horseshoeing; it is more pointed than the ordinary cut nail.

Formerly nails were always described as *six-penny, eightpenny,* etc., the word *penny* either referring to their price in medieval England or, more probably, being a corruption of *pound.* It is now becoming customary to describe nails by their length. The illustration will be valuable to anyone who has to purchase wire nails and is unfamiliar with the different sizes.

Nails are sold by the pound or in kegs of one hundred pounds. The price of all large nails is usually the same as that of the four-inch nail, but the smaller nails increase in price as they decrease in size.

Consult Smith's *Treatise on Wire; Its Manufacture and Uses.*

NAMES, Personal. A thousand years ago people had less need for names than we now have. There were fewer people in the world, and they moved about less, most of them never going more than a few miles from their birthplace. Besides, there were no newspapers, and nearly every person that a man had heard of he had also seen and could describe. So each boy or girl was given only one name instead of the three which most of us have to-day. If two boys in the same village were named *John,* one might be known as *Peter's son,* the other as *Jack's son.* When they grew up they could be distinguished as *John the carpenter,* and *John the shepherd,* or, perhaps, *John long* and *John short.* If one of them moved to a new home he might be spoken of as *John from the North,* or *John the Scot,* or *John from Selkirk.*

All of these names, except the one *Christian* name, were merely nicknames and might be changed at any time by the whim of friends. Originally even the name given a child by its parents had a meaning. So among the Hebrews *Isaac* meant *the laugher,* while *Solomon* signified *prince of peace.* All of our own common names for boys and girls were once equally significant. The same custom prevailed among the early Saxons, as we see from the name *Ethelwulf,* which means *noble wolf,* and it was revived by the Puritans, who called their daughters Mercy, Patience, Faith, Hope or Charity. All primitive peoples give names that have meaning, such as the familiar Sitting Bull and Rain-in-the-Face of the American Indians.

Gradually, no one knows just how, it became customary for nicknames to pass from father to son and be family names. Of course this had been the practice among the land-owning classes, whose members were known by their estates. Thus, the German and French names *von Hindenburg* and *de Chatcaubriand* mean *from Hinden Castle* and *from Briand Castle.* Very often, in the days when few could read or write, names became corrupted, and few of us know what was the original name of our family. Thus, Sanderson came from *Alexander's son* and Mitchell from *Michael.* Fitzhugh, Pugh (which was once *ap-Hugh*) and McCue are really the same, for *Fitz* and *ap* are Norman and Welsh for *son of,* while *Mc* means either the *son of* or *from the clan of.* The Irish *O',* the German *-sohn* or *-son,* the Scandinavian *-sen* or *-son,* the Russian and Serbian *-ovitch,* and the Rumanian *-escu* are all like the English *-son,* and the names Johnson, Johansson, Hansen, Ivanovitch and Jonescu are exactly alike in meaning.

Most people write their given names first and their family names last, but the Chinese reverse this plan. Thus Dr. *Sun Yat Sen* is properly called *Dr. Sun,* not *Dr. Sen.* An Italian workingman called Enrico Carbone, if asked his name, will usually say *Carbone Enrico,* but this is because he has been so taught in the army or in school, not because of national tradition.

NAMUR, *na mür',* an important industrial city of Belgium, and capital of the province of Namur, situated on the left banks of the Sambre and Meuse rivers, thirty-five miles southeast of Brussels. On its citadel hill, now used as a recreation park, the Aduatici, whom Caesar conquered, are supposed to have had a fortified camp. This historic and picturesque city has been many times a battle ground; three times it was stormed and captured by the French, and once by William III of England, and in August, 1914, after a terrific bombardment of forty-eight hours, damaging it to an incredible extent, it surrendered to the German army (see War of the Nations). It was defended by a circle of nine forts. In times of peace Namur is a prosperous manufacturing and trading center, with iron and brass foundries and noted manufactories of cutlery, machinery, chicory, glass, leather and bronze art products. Iron and coal deposits are found in the vicinity, and trading vessels ply up and down the Meuse. Among the distinctive features of the place is a beautiful cathedral in Renaissance architecture; the city is proud, too, of its art gallery and the Archaeological Museum, which contains a valuable collection of Roman and Frankish antiquities. In 1921, the city had a population of 32,274.

NANAIMO, *na ni'mo,* a city in British Columbia, located on the east shore of Vancouver

Island. It is forty miles directly west of Vancouver, with which it has ferry connection, and is seventy-two miles north of Victoria, with which it has connection by the Esquimalt & Nanaimo Railway (now a part of the Canadian Pacific system). The city is the capital of the electoral district of the same name. Population in 1921, 9,088.

Nanaimo is known chiefly as a coal-mining center and as a port. The Nanaimo coal field, with an area of 300 or more square miles, is the largest and richest in British Columbia, and supplies more than half of the province's annual production of that mineral. The coal mines, in fact, gave the city its popular name, the *Coal City*. As a port Nanaimo offers practically unlimited water frontage and a harbor which is remarkably safe and free from fogs. Nanaimo and its neighborhood have a large amount of shipping, in consequence of the export of coal to ports on the Pacific coast. It is also a lumbering and fishing center.

Nanaimo was founded in 1836 as a Hudson's Bay Company's post. It has never had a boom, but since the first development of the coal mines has grown steadily. It was incorporated as a city in 1874, and in 1900 purchased the waterworks system, which has remained under municipal control. The city also owns the electric-lighting system. The city has a fine high school and four public schools—the Central, South Ward, North Ward and Middle Ward. A Dominion biological station is situated on Departure Bay, a short distance north of the city. W.B.

NANA SAHIB, *nah'na sah'ib* (about 1820-about 1860), a name applied to DUNDHU PANTH, when he became leader of the Sepoys in the Indian mutiny in 1857 (see SEPOY REBELLION). He was an adopted son of the ruler of the Mahratta state of Bithur, and was educated as a Hindu nobleman, but became active in stirring up discontent upon the refusal of the British government to continue a pension which had been granted to his foster father. Upon the outbreak of the mutiny in Cawnpore he placed himself at the head of the rebels there, and though he promised to spare the British if they surrendered, he broke his word and committed such atrocities as horrified the world. After the rebellion was suppressed he fled to Nepal, and the time of his death is unknown. As a consequence of the mutiny the government of India was taken from the East India Company by act of Parliament (see INDIA, subtitle *Government and History*).

NANCY, *nahN se'*, the capital of the French department of Meurthe-et-Moselle, formerly the capital of the province of Lorraine, 220 miles east of Paris, on the railway to Strassburg. It is situated on the Meurthe River, six miles above its junction with the Moselle, and on the Eastern and Marne-Rhine canals. The first clash of the War of the Nations occurred on the Alsace-Lorraine frontier near Nancy, and the city was under bombardment a number of times in 1914 and 1915 (see WAR OF THE NATIONS).

Nancy's real importance dates from the fifteenth century, when Charles the Bold, one of the most powerful of the French vassals, was defeated by Rene II, Duke of Lorraine, and died at the city's gates. Nancy was the seat of the dukes of Lorraine until 1766, when it passed to the French, and it owes much of its architectural beauty to Stanislas Leszczynski, Duke of Lorraine and king of Poland, who made it one of the palatial cities of Europe. In 1814 and 1815 Nancy was occupied by the Allies who were fighting Napoleon; during the Franco-German War, in 1870, it was seized by the German forces, and compelled to pay a heavy ransom. The city is distinguished for its many imposing triumphal arches. Before the War of the Nations, Nancy had a population of 120,000; in 1921, 113,216.

NANKING', a Chinese city on the Yang-tse River, about midway between Peking and Canton, in former days one of the glories of the old Chinese Empire, of which it was the seat of government from 1368 to 1403. The name Nanking means *southern capital*. It is now the chief city and capital of the province of Kiangu-su, but derives much of its importance from its military college, arsenal and gun and ammunition factories. In the Tai-ping rebellion, which brought ruin and desolation to China between 1850 and 1864, Nanking suffered greatly. In 1853 it was captured by the rebels, who made it their capital, and it was not retaken by the government forces until 1864.

In the meantime nearly all of its historic monuments and public edifices, including its famous porcelain tower and the greater part of its magnificent encircling walls, were destroyed. The only features of historic interest that still remain are the tombs of several emperors of the Ming dynasty, on the eastern outskirts of the city. In Nanking, in 1842, was signed the first treaty between China and Great Britain. The city was the seat of government of the

viceroy of Kiang-nan, the most powerful of all the Chinese governors under the old empire. Population, 1919, 902,441.

NANSEN, *nahn'sen,* FRIDTJOF (1861-), famed as an Arctic explorer, was born near Christiania, and educated at the university in that city. He was interested particularly in zoölogy, and his first exploring expedition, in 1882, was made in search of zoölogical specimens. Later in that year he became curator of the Natural History Museum at Bergen. In May, 1888, he set out on an expedition across the ice field of Greenland, and succeeded in crossing from the east to the west side, an achievement which many Arctic authorities had declared impossible. On his return he published *The First Crossing of Greenland* and *Eskimo Life,* this latter the result of his winter sojourn with the Eskimos of Greenland.

FRIDTJOF NANSEN
The world's most famous Arctic explorer of the latter part of the nineteenth century.

The great object toward which Nansen looked forward was a Polar expedition; he had his own theory as to the correct method for such a trip. Driftwood from Siberia, and the appearance of relics from the *Jeannette* expedition, led him to believe that a ship might be carried by the ice drift north from Siberia across the Pole and south to Greenland. He succeeded in interesting the government of Norway in his theories, and a vessel, the *Fram* ("Forward"), was fitted out for him. This was specially built to withstand the pressure of the ice floes, having sloping sides so that the ice might lift and not crush it. Later the same vessel carried Roald Amundsen into both Polar regions, and to the discovery of the South Pole.

In the *Fram* Nansen left Christiania June 24, 1893, and in September forced his way into the ice pack near the New Siberia Islands. The *Fram* drifted, suffering no damage from the ice, until March 14, 1895, when Nansen and Lieutenant Johansen left it and set out toward the Pole with sledges. The latitude which they reached on April 7, 86° 4′, was 184 miles farther north than any point before attained by man, and within 272 miles of the Pole. Returning, they reached Franz Josef Land, where they were obliged to winter, and then departed for Spitzbergen. In June, 1896, they encountered the Jackson-Harmsworth expedition, with whom they returned to Norway. Meanwhile the *Fram,* after drifting to latitude 85° 57′, had turned back, and reached Norway soon after Nansen's arrival.

The explorer was given a most enthusiastic reception, had honors showered upon him by various countries, and achieved a great popular success in his lecture tours through Europe and the United States. His *Farthest North* is a very interesting account of the expedition. Nansen played a prominent part in the separation of Norway from Sweden, and from 1906 to 1908 was minister to England from Norway. In the latter year he returned to Christiania and took up his work as professor of oceanography in the university there. See FRANKLIN, SIR JOHN. Later and more successful voyages are described under POLAR EXPLORATIONS.

Consult Nansen's *Farthest North;* Dolman's *Dr. Nansen; the Man and His Work.*

NANTES, *nahNt,* in English, *nants,* the seventh largest city of France and one of the most beautiful in the republic, is the capital of the department of Loire-Inférieure. It lies upon the right bank of the Loire, 250 miles southwest of Paris. The rise of the port of Saint Nazaire, nearer the mouth of the Loire, and the difficulty in the navigation of this river have tended to reduce the commercial importance of Nantes. However, in 1891 a ship canal uniting these two places was constructed to restore the rightful prestige of the older city. There are five miles of quays on the banks of the river, and in 1914 over $5,000,000 was spent in improving the harbor. Shipbuilding is carried on extensively, and other industries include the preparation of sardines and the manufacture of sugar, nets, sailcloth, soap and machinery.

Among the old buildings of interest are the cathedral, begun in 1434 and still unfinished; and the ducal castle where, in 1598, Henry IV signed the Edict of Nantes (see below), giving freedom of religion to the Huguenots (which see). The more recent buildings of note are the Church of Saint Nicholas, the hall of justice, a picture gallery containing works of modern French masters, a museum of natural history, and the Exchange, the latter one of the finest buildings in France.

For a long time Nantes formed one of the most valuable possessions of the dukes of Brit-

tany, but in 1499, when Anne of Brittany married Charles VIII, it passed to the crown of France. In 1793 it was the scene of some of the most terrible massacres of the French Revolution. Between 1865 and 1870 the old town was demolished, and since then the city's natural beauties have been much improved by art and many notable new structures. Population, 1921, 183,704.

NANTES, Edict of, one of the most celebrated royal decrees in history, memorable as the first formal recognition by a great European country of the principle of religious toleration. It was signed on April 13, 1598, by King Henry IV of France, in the city of Nantes, and marked the end of a struggle between the Roman Catholics and Protestants that had long harassed the kingdom. By this decree the Huguenots (French Protestants) were given the same civil rights as the Roman Catholics, and granted liberty of conscience in religious matters, on condition that they pay tithes to the Roman Catholic Church and celebrate the Church festivals. In addition they were permitted to remain in possession of their fortified towns, among which was the city of La Rochelle. The edict remained in force until its revocation by Louis XIV in 1685. He was persuaded to this step by Madame de Maintenon.

NANTICOKE, *nan'ti kohk,* Pa., a borough in Luzerne county, situated in the northeastern part of the state, seven miles southwest of Wilkes-Barre. It is on the Susquehanna River and is served by the Pennsylvania Railroad and by electric interurban lines. Anthracite coal mines in the vicinity employ 10,000 men. Silk mills, hose factories and cigar factories are leading industrial establishments. The city has a splendid system of parks, a $200,000 high school building, a city hall and a state hospital. The settlement of Nanticoke was begun in 1850 and it was chartered as a city in 1874. The population, among whom are many Slavs, was 18,877 in 1910; it was 23,614 in 1920, a gain of twenty per cent. The area of the borough is three square miles.

NANTUCKET, *nan tuk'et,* an island off the coast of Massachusetts, eighteen miles south of Cape Cod and sixty miles southeast of New Bedford. Its mild climate and beautiful scenery have made it a very popular summer resort, and there is frequent communication by steamer from New Bedford, Wood's Hole and Marthas Vineyard. The island, with adjacent islets, forms the county of Nantucket, Mass., with the county seat of the same name.

The chief occupations are fishing and coastwise trade; Nantucket had formerly important whale fishery interests. There is a good public library, Admiral Sir Isaac Coffin's Lancastrian School and Muskeget Park. The island was settled in 1659. The population is about 3,000.

NAPANEE, *nap a nee',* a town in Ontario, the county town of the united counties of Lennox and Addington. It lies on the Napanee River, which is navigable to the Bay of Quinte, seven miles away, and is on the Grand Trunk and Canadian Northern railways, 135 miles east of Toronto and twenty-eight miles west of Kingston. Napanee is important as a manufacturing center, its principal products being flour, brick and tiles, lumber, furniture, motor boats, carriages and cutlery. The surrounding country is a good farming district, and supplies materials for the town's creamery and cannery. Napanee has the county buildings, a collegiate institute, an armory, a park and a race track. Population in 1911, 2,807; in 1921 (Dominion census), 3,038.

NAPHTHA, *naf'tha.* What is called naphtha in America is distinguished by the name *petroleum naphtha* elsewhere. Since ancient times the word *naphtha* has been applied to a large number of volatile (rapidly-evaporating) liquids, the first of which was a fluid form of asphalt burned in lamps by the ancient Egyptians. The word occurred in a number of the ancient languages and originally meant *moist;* it is from the same root as the name of the sea god Neptune.

Petroleum naphtha is now the most important form of naphtha throughout the world. It is the volatile part of the oil, from which gasoline, benzine and similar products may be taken by refining. Naphtha is the source of much of the illuminating gas now manufactured, and is valuable as a cleaner, as a dissolver of rubber and as a domestic fuel. See Petroleum.

NAPIER, *nape'yur,* or *na peer',* John (1550-1617), a Scotchman born in Edinburgh, famed as the inventor of logarithms, a means of shortening mathematical calculations (see Logarithms). He was one of the first great British mathematicians. Besides the system of logarithms, he invented various mechanical devices for multiplying and dividing, and extracting square and cube roots (see Calculating Machines), and he also originated a number of formulas in trigonometry. By a certain writing called the *Plaine Discovery of the Whole Revelation of Saint John,* published in 1594, he attempted to show that the Pope is antichrist.

NAPLES, the largest city of Italy, with a population exceeding that of Rome by over 100,000. Naples is one of the busiest ports and manufacturing centers of the country, and is more beautifully situated than any other European city except Constantinople. It lies on the north shore of the Bay of Naples, at the foot and on the slopes of hills that, seen from the water, have the aspect of a vast amphitheater. Mount Vesuvius, forever a possible source of death and destruction, rises in solitary grandeur on the plain of Campania, ten miles to the southeast. To the south, across the bay, may be seen the lovely isle of Capri, and on the eastern shores, many little Italian villages surrounded by beautiful vineyards and groves.

Architecturally, Naples is inferior to most cities of its size, but there are many buildings of archaeological interest. The National Museum contains a priceless collection of paintings, sculptures, coins, antiquities and various objects recovered from the buried cities of Herculaneum and Pompeii. Among its sculptures are the famous *Farnese Bull* and *Farnese Hercules* (a picture of the latter is shown in connection with the article HERCULES). There are many castles reminiscent of medieval days, one of the most interesting of which is the egg-shaped Castello dell' Ovo. The so-called "New Castle" (Castello Nuovo) has a sculptured arch, used as a portal, that ranks with the best medieval architecture of Southern Italy. Of about

NAPLES, WITH VESUVIUS IN THE DISTANCE

Naples is said to be the noisiest and most densely-populated city in Europe. Here Italian life may be seen in its most sordid and its most picturesque phases. "There is material in every Neapolitan street," writes one observer, "for an entire travel story on manners and customs." The eastern section is the oldest part of the city, and the center of commercial life. Formerly its people were crowded together in unsanitary old tenements, on dirty, narrow streets, but the government has partly remedied these conditions, and the disreputable slums and many of the filthy flat buildings have disappeared. Streets have been widened, new sewerage and water systems installed, and electric car lines built. The newer western section lies along the famous Riviera di Chiaia, a beautiful drive skirting the bay for three miles.

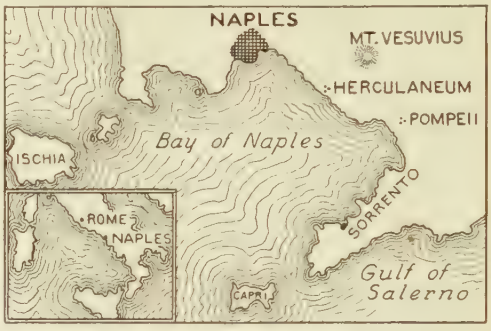
300 churches, the Gothic cathedral, containing many fine examples of painting and statuary, is the most notable.

The city has numerous educational institutions. The University of Naples, founded in 1224 by Emperor Frederick II, has an enrolment of about 6,600 students in normal times. There are, among other institutions, an astronomical observatory, a botanical garden, a royal conservatory of music, and an aquarium (in National Park) where is carried on a scientific study of the plant and animal life of the Mediterranean. A striking characteristic of the people of Naples is their interest in theatrical amusements. In the San Carlos, one of the largest opera houses in Europe, many of the world's famous stars of grand opera have been heard. Industrially, the city is important as a

center for the manufacture of ships, locomotives, textiles, gloves, glass and machinery. Its commerce, in times of peace, is extensive, both as regards exports and imports; nearly 9,500 vessels a year entered its harbor before the outbreak of the War of the Nations.

Naples was founded by a Greek colony from Cumae several centuries before Christ. In the Middle Ages it was made the capital of the Kingdom of the Two Sicilies (see SICILIES, KINGDOM OF THE TWO). The tomb of Vergil, the ruins of the ancient cities of Herculaneum and Pompeii, destroyed by an eruption of Vesuvius in A. D. 79, and the remains of Roman temples, palaces and tombs make the surrounding region unusually interesting. The city is now the capital of the province of Naples; in 1915 its estimated population (including suburbs) was 697,917.

Bay of Naples, an inlet of the Mediterranean Sea, famous for the beautiful scenery along its shores and the deep blue color of its waters. It indents the southwest coast of Italy, and is twenty miles wide between its northwestern and southeastern points, Cape Miseno and Point Campanella. On its shores are the city



of Naples and many towns and villages, and near by towers the celebrated Mount Vesuvius. Two charming islands, Ischia and Capri, lie at the entrance of the bay.

Consult Hutton's *Naples and Southern Italy.*

NAPOLEON I (1769-1821), or NAPOLEON BONAPARTE, emperor of the French, the most dominating individuality and the greatest military genius of his day. At his frown the kings of Europe were ill at ease; against him the whole of Europe was in a perpetual state of war for nearly a score of years. In view of his remarkable career, it is surprising to learn from the French historian and critic, Taine, that Napoleon was disappointing in appearance. In height he was dwarfed by all who surrounded him, for he was only five feet one inch tall. Lowering brows accorded ill with his weak mouth; his personality lay in his eyes. He was called insignificant by those who had never looked into those eyes.

Born at Ajaccio in Corsica on August 15, 1769, he was the fourth child and second son of Carlo Maria de Buonaparte, as the name was then spelled, and Letizia Ramolino. Both his parents were of aristocratic descent. At the time of his birth the island of Corsica was passing through a troublous period, and his father had shown ability as a schemer and intriguer in following the policy most likely to benefit himself and his family. On the acquirement of the island by France, the elder Buonaparte secured a nomination for his son Napoleon to the military school of Brienne. After a few months spent in learning the French language and having already expressed his determination to become a soldier, Napoleon entered the military school at the age of ten. From Brienne, after a course of education to which he later always referred with contempt, he was transferred to the military school at Paris, where discipline was stern and education of a higher order. His scholastic career was not brilliant, and he received his commission in the artillery in 1785 without having given evidence of any marked ability, except perhaps that of holding his own counsel and of carrying through to the end any attitude adopted. These traits, which afterwards made him feared equally in the council chamber and on the battlefield, he inherited from his mother.

On joining the artillery he was made to fulfil all the duties of a private soldier, a corporal and a sergeant before he assumed the rank given him by his commission. Setting himself to the task of thoroughly mastering the theoretical and practical details of his profession he devoted much of his time to study; his guiding motive at first appears to have been the patriotic desire of freeing Corsica from the yoke of France. Spending many months on leave of absence in Corsica, he took part in the patriotic movement of Paoli, with whom, however, he was never in full accord.

In 1792 he was again in Paris when the mob attacked the Tuileries, and he received the rank of captain. A quarrel with Paoli in Corsica in 1793 decided him to throw in his lot completely with the French revolutionary party in the island and he was forced to take refuge in France. Rejoining the army, he took part in the occupation of Marseilles by the revolutionary forces and marched against Toulon, which, strongly supported by English and Spanish troops, was a great menace to the revolutionary cause. Being practically in command of the artillery at the siege of Toulon, he won golden opinions and promotion to the rank of general of brigade. The fall of Toulon was due to the strategy, power of organization and concentration of Napoleon, and General du Teil called upon the ministers to "consecrate him to the glory of the republic."

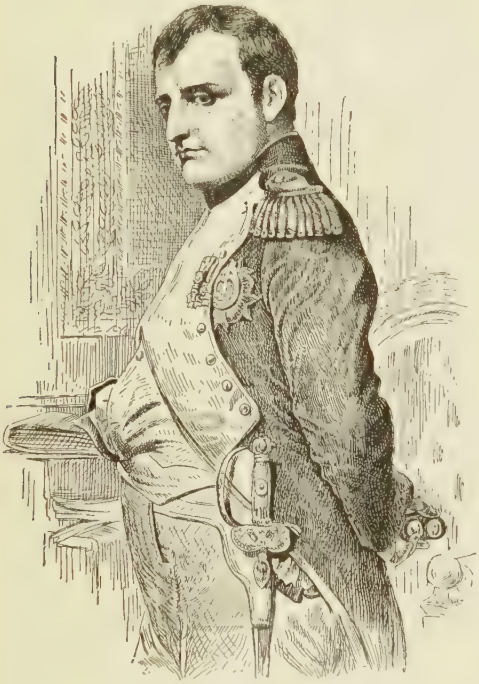
Napoleon's military career practically began at Toulon, after which, in acknowledgment of the ability he displayed, he received the command of the army about to invade Italy. It was about the time of the siege of Toulon that he conceived the prevalent idea of all his future campaigns, that of concentration against one particular point of the enemy's line. With one point broken or weakened the army becomes a chain dependent on its weakest link. His campaigns at the head of the army in Italy were characterized by many rebuffs, which he met with fortitude. Placed under arrest, charged with disclosing the plans of campaign, his situation was almost desperate. It was a time when men were sent to death on mere suspicion and no man's life was safe. The commissioners sent by the Convention, suspicious and jealous, yet with not a shred of evidence against him, set him free in time to win a victory against the Austrians at Dego, in 1794; but Napoleon's campaign was canceled and Scherer was placed in supreme command. Even then he had faith in his destiny.

Fame at the Age of Twenty-Six. Again in Paris, poorly clad and ill fed, Napoleon waited for better fortune. The Convention was nearing its close, royalist reaction was making headway, and 30,000 National Guards were massed against the Convention, which was protected by Barras. Having seen him at Toulon, Barras nominated Napoleon as his second in command. Napoleon's great chance was at hand. He had one night in which to make preparations to defeat the mob which threatened the Convention. His activity was amazing, his resourcefulness superb. With a "whiff of grapeshot" he cleared the streets of Paris and paved his own road to power. Royalism was defeated, the Convention dying, and democracy, in the form of the Directory, rose in a night and brought into power the man who was in time to crush democracy and monarchy alike and centralize a world-power in one individual. Napoleon's "whiff of grapeshot" made October 5, 1795, a red-letter day in the history of Europe.

Marriage to Josephine. Becoming a member of the Directory, Barras interested himself in the hero of the hour, and it was at his house that Napoleon first met Josephine de Beauharnais, who at once inspired in him a romantic passion. Though penniless, Bonaparte pressed his suit, was strongly supported by Barras, and the marriage was arranged. Josephine seemed afraid of her impetuous wooer, yet carried beyond herself by his enthusiastic domination. Two days after the marriage Napoleon set out to take command of the army in Italy. Having previously drawn up a plan of campaign he submitted it to the Directory, who instructed Scherer, then in command in Italy, to carry it out. Scherer replied that if the Directory wanted that plan of campaign carried out they should send the man who drew it up to do so. His suggestion was taken. Napoleon arrived in Nice in March, 1796. Naples, Parma and Modena were forced, by operations culminating at Lodi, to sue for peace. Army after army sent by Austria was crushed; Napoleon carried the war into the enemy's country, and Austria, shorn of the Netherlands and Lombardy, accepted terms of peace at Campo Formio in 1797. Napoleon returned to Paris, a hero, in great favor with the people.

Becomes First Power in France. In days when men eyed their neighbors askance and a leader of the people was to be dreaded, the rise of Napoleon was viewed with disfavor by the Directory. The very men who promoted him now feared the power they had created. An

opportunity to get his disturbing personality out of France was eagerly seized. Napoleon's power with the army was now enormous, the devotion of his men amounting almost to worship. To rid the country of him and at the same time to strike a blow at England, the power then most to be feared, he was dispatched to Egypt, where at first he met with



NAPOLEON BONAPARTE

his usual brilliant success. The destruction of the French fleet by Lord Nelson, at the battle of the Nile, in 1798, however, turned the tide of events, and after meeting with varying fortune Napoleon, prompted by news of the infidelity of Josephine and the intrigues of the Directory, handed over the command to Kleber and returned to Paris. By a bold stroke he abolished the power of the people who sought to crush him. The Directory ceased to exist; a new constitution was drawn up, with Napoleon as First Consul. The Corsican "corporal" was ruler of France.

It was in 1803, while First Consul, that Napoleon entered into the negotiations with the United States which culminated in the Louisiana purchase. Being in imperative need of money to carry on his wars and deciding that the dream of a western empire for France must be abandoned, the First Consul sold to the United States a vast territory covering nearly a million square miles, land which is now divided into eighteen states.

Successful Against All of Western Europe. Although his government was marked by sagacity and vigor, Napoleon's mind dwelt continually on war and conquest, and it was almost impossible for him to settle down to the arts of peaceful government. His dreams of an eastern empire had been shattered. India, which he had hoped to subdue after Egypt, was beyond his reach. Austria still occupied Northern Italy. A blow, quick and decisive, must be struck. War was his element, and on his armies depended his popularity and his power. In 1800 he conducted his famous march across the Alps, by the Great Saint Bernard Pass, into Italy. At Marengo the Austrian army was confronted, and Napoleon would have been annihilated but for the timely arrival of Desaix and Kellerman with reënforcements, which changed a rout into a victory. Austria was again defeated at Hohenlinden on December 2, 1800, and terms of peace were arranged and signed by Joseph Bonaparte at Lunéville in February, 1801.

England was then France's only remaining active enemy. France was compelled to evacuate Egypt; Malta was retaken by the English. The Treaty of Amiens, signed by Cornwallis for England and by Joseph Bonaparte, on March 27, 1802, gave France the first real peace for ten years. Spain, Naples, Bavaria, Portugal, Russia, Turkey and, finally, England, had all been forced into treaties directed by the sallow, undersized Corsican. In all these treaties were buried the seeds of future wars, carefully sown by the master mind of Napoleon, seeds that were shortly to grow like dragon's teeth into armies beneath whose tread Europe must again tremble.

Becomes Emperor. Not satisfied with the appointment of Consul for life, which had been conferred on him by an unanimous vote of the people, Napoleon began to dispense with any governmental form and power except that vested in himself, and, being offered the title of Emperor by the Senate, he was crowned as Emperor Napoleon I on December 2, 1804, in the presence of Pope Pius VII. It is said that being impatient, he snatched the crown from the Pope's hand and, placing it on his own head, ordered the Pope to proceed quickly with the ceremony.

While Napoleon's life is best known for its military side, yet he ruled the internal affairs

of France as personally as he guided its armies. His Code Napoleon, a system of laws promulgated under his order, was a concise outline of judicial procedure. He also did much to encourage elementary education.

Begins to Dominate Europe. Napoleon, like Caesar of old, had cast longing eyes at England, and now planned its invasion. War broke out in 1803 and the Emperor prepared to put his plan into execution. Russia, Austria and Sweden uniting with Great Britain, Napoleon was forced to use his "army of invasion" to crush the continental opposition, rather than to subdue the "nation of shopkeepers," as he described the English. Mack, the Austrian general, was compelled to surrender at Ulm (1805). In the same year Napoleon entered Vienna and a month later completely routed the Russian and Austrian armies at Austerlitz, one of the most brilliant victories of his whole career. Meanwhile, Nelson, by his great victory at Trafalgar, had completely established the supremacy of England at sea.

Napoleon now set himself to order the affairs of the territories that had come into his hands. He was a believer in the theory that "The object of war is victory; of victory, conquest; and the object of conquest is occupation," and he proceeded to change the map of Europe to his liking. Britannia might rule the waves, but on land the whole of Europe bowed to the will of Napoleon, backed by his artillery. His brother, Joseph Bonaparte, was made king of Naples, another brother, Louis Bonaparte, was declared king of Holland, and districts of Germany and Italy were created into principalities and dukedoms and distributed among the emperor's favorite, or most successful, generals. This arbitrary proceeding brought about further war with Prussia. But the star of Napoleon was still in the ascendant, and the year 1806 brought more glory to France and deeper degradation to Prussia. The battles of Jena and Auerstädt opened the way to Berlin, where Napoleon as a conqueror issued the Berlin Decree, instituting the Continental System, completely isolating England.

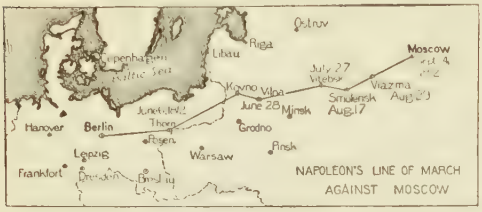
Advancing against the Russians, he met with disaster at Poltusk and Eylau, but quickly recovering, inflicted a crushing defeat on the Russian army at Friedland, in the summer of 1807, and the czar was compelled to sue for peace. By the Peace of Tilsit Prussia received back about half her dominions, and Russia agreed to close her ports against all British trade. Jerome, the younger brother of Napoleon, was made king of Westphalia; Warsaw was created a duchy and given to the king of Saxony; whole provinces were divided and new ones created at the whim of the mighty conqueror.

Still there were other regions open to the thunder of Napoleon's armies. Portugal had not obeyed the Berlin Decree. Dispatched with a large army of invasion, Junot occupied Lisbon. The affairs of Spain were badly managed; Murat was sent to Madrid, and Charles IV was dethroned. Joseph Bonaparte was not contented with Naples. Here was the throne of Spain ready for his occupation—Murat should take Naples as his share of the plunder. So Napoleon juggled with thrones and kingdoms. Europe was outraged, but lay silent and sullen beneath the guns of the conqueror. England, recovering from her stupor, realized the menace in the figure of the emperor, looking across the narrow English Channel, waiting an opportunity to strike. Spain was in arms, and needed help to drive out the usurper. Thus began the Peninsular War, which lasted seven years. Meanwhile, Austria had again declared war and raised an army under the Archduke Charles. Napoleon encountered him. It was a case of Caesar's "I came, I saw, I conquered," over again. At Eckmühl the Austrians were routed. Himself defeated at Aspern and Eslingen, the later victory at Wagram (1809) enabled the invincible Corsican again to enter Vienna as a conqueror and dictate terms of peace.

Returning to Paris, he cruelly divorced Josephine, who had borne him no children, and soon afterwards married the Archduchess Maria Louise of Austria, who bore him one son. The principal object of Napoleon was now to crush the disturbance in Spain, and to this he devoted the chief power of his mighty armies. Only in the Peninsula was England directly responsible for operations against Napoleon, but Britain liberally subsidized other movements and its ships seized French colonies wherever possible. In the Peninsula the armies of France were meeting with reverses, and were slowly, but surely, driven out of the country.

Disaster in Russia. Russia had been unable literally to carry out the behests of the Berlin Decree. In 1812 Napoleon declared war and invaded Russia with an army of nearly 600,000 men. The Russians had learned wisdom, and would not face the invaders. Retiring step by step, laying waste the country as they went, they led the French into the interior. At Boro-

dino and elsewhere the avalanche of French overwhelmed Russian resistance. Napoleon pushed on to Moscow, only to find the city in



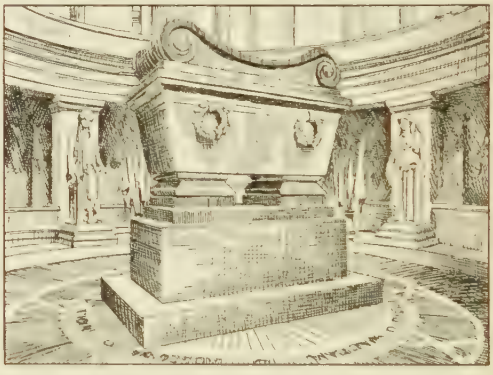
flames and behind him a country utterly devastated. It has been claimed that the weary march back began the breaking up of that mighty intellect which had ruled Europe so long. What war could not do to the army of

THE TOMB AND COFFIN OF NAPOLEON

the "Little Corporal" the piercing cold and famine on the plains of Russia accomplished. Swarms of Cossacks hung like jackals on their flanks; the weakened veterans, heroes of numberless battles, succumbed to cold and disease, and of that gallant army of 600,000 only about 25,000 left the country. It was the beginning of the end for Napoleon. Leaving Murat in command, he hastened to Paris to organize a fresh army before the news of his terrible disaster reached Western Europe. But his prestige was gone. England and Russia at once assumed the direction of the destinies of Europe.

Coalition Against France. Prussia, Russia, Sweden and Spain were roused and joined Great Britain against Napoleon. The allies were defeated at Lützen, Bautzen and Dresden, but the allies were able to reënforce their armies, while Napoleon was fighting with the total remnant of his strength. Disaster overtook him at Leipzig and in the "Battle of the Nations," October, 1813, he was completely defeated. Raising with herculean efforts a new army, he confronted the allied hosts from January to March, 1814. The Duke of Wellington was advancing on Paris from the south. Napoleon was outnumbered; his prestige was gone; his trusted veterans had been left amid Russian snows; he had but an army of recruits to depend on.

Elba, Waterloo, then Saint Helena. In April, 1814, Napoleon abdicated. With the title of emperor and six million francs, he retired to the island of Elba and Europe breathed freely —only for ten months, however. Escaping from Elba, Napoleon, everywhere joined by old followers, made a triumphal entry into Paris, and the allied armies once more took the field against him. On June 16, 1815, he defeated Blücher at Ligny, while Marshal Ney, who had



joined him after declaring he ought to be kept in an iron cage, fought the British at Quatre Bras, under Wellington, who fell back on Waterloo. On June 18, he was attacked at Waterloo by Napoleon, whose army was totally defeated in the most historic battle of modern times. Fleeing to Paris, Napoleon again abdicated and tried to escape from France. Failing in this, he surrendered to the captain of a British man-of-war, who conveyed him to England, nominally a guest, in reality a prisoner. He was then conveyed to Saint Helena, a forbidding, desolate island in the Atlantic, off the

west coast of Africa. All the world feared to have him free. In solitude, under the care of a stern, harsh British governor, he spent the remainder of his days. He died a victim of cancer on May 5, 1821, was buried in the island, but in 1840 his remains were disinterred and conveyed to Paris. They now repose beneath the dome of the Hotel des Invalides, here illustrated. F.ST.A.

Consult Carlyle's *French Revolution*, for dramatic setting prior to Napoleon's ascendancy; Rose's *Life of Napoleon I;* Fournier's *Napoleon I, a Biography;* Macaulay's *History of England,* so far as it relates to the Napoleonic era.

Related Subjects. The following articles in these volumes will give added information on the subject of Napoleon and will make clear certain references in the above article:

Austerlitz	Louisiana Purchase
Barras, Count de	Lützen, Battles of
Bonaparte, with numerous subheads	Marengo, Battle of
Code Napoleon	Maria Louisa
Continental System	Murat, Joachim
Corsica	Nelson, Horatio, Viscount
Directory	Reichstadt, Duke of
Elba	Saint Helena
France, subtitle *History*	Trafalgar
French Revolution	Tuileries
Jena	Waterloo, Battle of
Josephine, Marie Rose	Wellington, Duke of
Leipzig, Battles of	

NAPOLEON II, the only son of Napoleon Bonaparte. See Reichstadt, Napoleon François Joseph Bonaparte, Duke of.

NAPOLEON III, Charles Louis Napoleon Bonaparte (1808-1873), emperor of the French in 1852, and nephew of the great Napoleon I. His father was Louis Bonaparte, king of Holland, his mother Hortense, daughter of Napoleon's wife, Josephine Beaucharnais, and he was born in Paris, April 20, 1808. His youth, after the overthrow of Napoleon in 1815, was spent with his mother in exile, but the greatness of the Bonaparte family was kept ever before him, and from the time he was twelve years old he seems to have had dreams of empire. A thoughtful, serious boy, he made excellent progress in his studies, and might have been content to become a scholar and man of letters had he not felt that the tradition of his house demanded more of him. When the Duke of Reichstadt, Napoleon's son, died in 1832, Louis Napoleon felt more certain than ever of his destiny, and began to lay plans to achieve it. Still compelled by Louis Philippe to live in exile, he wrote books and articles on various subjects and so kept his name before the people.

In 1836 he became convinced that the government of Louis Philippe was weak and unpopular, and attempted to stir up the garrison at Strassburg to revolt and support his claims. The result was a ludicrous failure, and he was sent to America, without being subjected to trial. On his return in the next year he went to live in London, but kept in close touch with affairs in France, and in 1840 made another attempt against Louis Philippe. This time he was sentenced to life imprisonment, but escaped, not at all discouraged in his ambition. When the Revolution of 1848 broke out he returned to France, but was compelled by the distrust of the provisional government to leave the country. Later in the same year he returned, having been elected to the National Assembly by five departments, and in December was elected its President. For a time the President and the Assembly seemed to work in harmony, but mutual distrust arose, and in December, 1851, Louis Napoleon ended the contest in his own favor by a sudden show of military force. Elected President of the republic for ten years by an overwhelming majority, he forced the people to concur the next year in the change from republic to empire, and he himself saw his dreams realized when he was crowned as Napoleon III. In the next year he married Eugénie-Marie de Montijo, the marriage being prompted by affection rather than by ambition.

But France had not the same position before the world which it had had in the days of the first emperor, and Napoleon III set about regaining it. France took, therefore, a leading part in the Crimean War, as the ally of England and Turkey against Russia, and espoused the cause of Italy in the struggle against Austria. Napoleon led the French armies and though he proved to be no general, had a share in the victories of Magenta and Solferino. The treaty which he concluded at Villafranca with Austria was selfish, in that it neglected the interests of Italy and considered only France, which received the provinces of Nice and Savoy.

Napoleon next attempted to set up a "Latin and Catholic" empire in Mexico by placing the Archduke Maximilian on the throne of that country, but the result was utter failure. After the Seven Weeks' War between Prussia and Austria he began to look upon Prussia as the natural enemy of France and to look forward to a contest between the two countries. Actual war broke out in 1870, and Napoleon led the

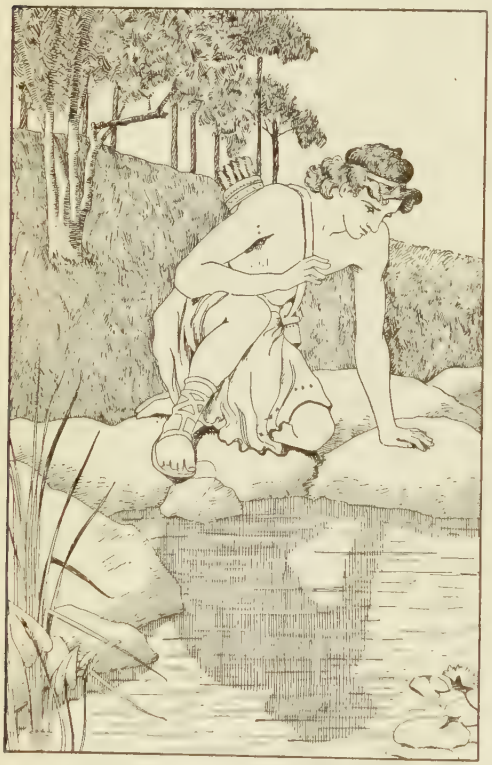
French forces, but was captured at Sedan on September 2 and subjected to imprisonment in Germany. His wife and son fled to England, and there, after peace had been declared in 1871, Napoleon was allowed to join them. His death occurred at Chislehurst, in Kent. A.MC C.

Consult Simpson's *Rise of Louis Napoleon;* Barthez's *Empress Eugenie and Her Circle.*

Related Subjects. The reader is referred to the following articles in these volumes:

Bonaparte, subhead Louis Bonaparte
Crimea, subhead Crimean War
Eugénie-Marie de Montijo
France, subtitle *History*
Franco-German War
Louis Philippe
Napoleon I
Sedan, Battle of

NARCISSUS, *nar sis' us,* a character in Greek mythology, son of Cephissus, the river god, and Leiriope, a nymph. Narcissus was a handsome



In some delicious ramble, he had found
A little space, with trees and rocks around;
And in the midst of all, a clear, deep pool.
KEATS.

lad, very vain of his own beauty, and indifferent to beauty in others. Echo, a nymph, and a favorite of the gods, was so wounded by his rejection of her love that she faded away until only her beautiful voice remained. The gods, angered by Narcissus' coldness and Echo's death, caused him to fall hopelessly in love with his own image, mirrored in a spring. Fascinated by his own face, he bent unceasingly over the spring until he, too, died and was changed by the gods into the flower that bears his name.

NARCISSUS, a large group of popular early spring flowers which send up their lovely blossoms from brown-coated bulbs. This group includes the dainty yellow jonquil, the gay, golden daffodils and the lovely white narcissus. Nearly all are natives of Europe, but for their hardiness, sweet fragrance and delicately fashioned blossoms of yellow or white have been widely cultivated indoors and out. The jonquil and daffodil are described under their titles in these volumes.

Of the narcissi, the *poet's narcissus,* or *pheasant's eye,* is a hardy favorite. It produces a single fragrant, wide-open blossom on each stalk. White petals surround a very short, yellowish tube which has a crinkled red edge. It is said this is the species immortalized by classical writers of long ago. The *paper white narcissus* and the *polyanthus narcissus,* or *Chinese sacred lily,* with their deliciously fragrant blossoms of pure white, appearing in clusters of from four to twelve amid narrow, flat green leaves, are general favorites for winter cultivation in hothouses. If bulbs are planted outdoors in autumn, three to four inches deep, in loose, good soil, masses of fragrant blossoms will appear in May.

PAPER NARCISSUS
Flower and bulb.

The name is from the Greek word meaning *numbness,* or *torpor,* and was suggested by the reputed sleep-giving qualities of the perfume of the blossoms.

NARCOTIC, *nahr kot' ik.* There are certain substances that have a marked effect upon the nervous system, producing insensibility to pain, stupor, sleep or coma, according to the dose. Such substances are called *narcotics,* a term derived from a Greek word meaning *to make numb.* Opium, the effects of which are de-

scribed under that title, is one of the narcotics most commonly used; others are Indian hemp (hashish), belladonna, hyoscyamus (the leaves of henbane), chloral, cocaine, tobacco, alcohol (in strong doses) and certain drugs derived from coal tar (which see). When a narcotic is given in sufficient quantity to cause sleep or coma, it is called a *hypnotic;* the term *anodyne* signifies a drug that relieves pain by benumbing the nerves. It will be seen, therefore, that a narcotic may be both an anodyne and a hypnotic. In a sense the general anesthetics, ether and chloroform, are narcotics, but their effects do not last so long as those of true narcotics.

In medicine narcotic drugs have a place of wide usefulness, but they also have very dangerous possibilities. Too large doses may cause not only insensibility, but death. The indiscriminate use of opium and its derivatives to relieve pain has caused in numerous instances the formation of a terrible drug habit. For these reasons no one should ever resort to the use of these drugs except under the direction of a physician who is thoroughly reliable. State, provincial and national governments are now protecting the public by enforcing stringent laws regarding the distribution and use of narcotics.

Related Subjects. The reader is referred to the following articles in these volumes:

Belladonna	Hashish
Chloral	Morphine
Cigarette	Opium
Cocaine	Tobacco

NARRAGANSETT, *nair a gan' set,* a powerful tribe of Indians who lived in colonial times in what is now Rhode Island, west of Narragansett Bay. This tribe, belonging to the Algonquians, numbered several thousand when first known to New England settlers. They made friends with Roger Williams, but in 1675 joined the armies of King Philip, the son of Massasoit. In a great battle in a swamp near Kingston, R. I., nearly one thousand Narragansetts were killed, and the rest of the tribe were later scattered among Indians of the North and West. The few who survive are not pure-blooded Narragansetts.

NARRAGANSETT BAY, an inlet of the Atlantic Ocean extending into the State of Rhode Island about twenty-eight miles. By reason of its long and indented shore line it greatly enhances the commercial advantages and transportation facilities of the state. Newport, until 1900 one of the capitals of Rhode Island, and America's most famous summer resort, is situated on an island in the bay, five miles from the Atlantic Ocean. Providence, the official capital of the state, is on the western shore of the bay at the head of navigation. At its entrance, from Sakonnet Point to Point Judith, Narragansett Bay is about eighteen miles wide. Its largest island is Rhode Island; others are Conanicut, Prudence and Hog.

NARVAEZ, *nahr vah'aith,* Panfilo de (1470?-1528), a Spanish soldier and adventurer who is best remembered for his attempt to explore what is now Florida. He was born in Valladolid, sailed to America in 1498 and took part in the conquest of Cuba under Velásquez. In 1527 he led an independent exploring expedition and reached the west coast of Florida, landing, it is supposed, at Tampa Bay with five ships and about 600 men (April, 1528). He marched inland, but lost half of his men in encounters with the Indians, and when after desperate struggles he reached the coast, he was unable to find his ships. Rude boats were built, in which Narvaez and about 240 survivors embarked for a voyage along the western coast. Driven out to sea in a storm, he and all his men perished, with the exception of four. These finally reached Mexico after wandering about for several years.

NARWHAL, *nahr'wal,* a large mammal found in the northern seas, of great value to the Eskimo as a source of food, weapons and tools. The narwhal belongs to the family of whales and is frequently called the *sea unicorn,* because of a long spiral ivory tusk growing out of the left side of the head of the male, which probably constitutes a very effective weapon of attack and defense. In some cases there are two of these tusks, each of which is the outgrowth of a tooth in the upper jaw. Otherwise these animals are toothless. The length of the narwhal is from twelve to fifteen feet, the tusk being from six to ten feet in length. The body color is dark gray above and white below, with darker patches on the sides. The head is short and rounded and there is no dorsal fin. These animals feed on fish and mollusks. The narwhal and seal are the mainstay of the Greenlanders, and the capture of a narwhal is an interesting event, as oil is obtained from the blubber, and the skins and ivory are made into tools and other useful articles.

NASBY, *naz'bi,* Petroleum V. See Locke, David R.

NASEBY, *nayz'bi,* Battle of, the English battle which decided the issue of the first war

between Charles I and Parliament. The conflict took place on June 14, 1645, in the parish of Naseby, in Northamptonshire. The Parliamentary army was commanded by Cromwell and Sir Thomas Fairfax. Cromwell attacked the enemy's center, Fairfax pressed it from the front, and gradually the Royalist infantry separated into small groups which surrendered one after another. The spoils included a hundred standards and colors and the private papers of the king. This battle meant practically the complete annihilation of the last field army of Charles I.

NASHUA, *nash'u a,* N. H., a manufacturing center in Hillsborough County, situated in the southeastern corner of the state, eighteen miles south of Manchester and forty miles northwest of Boston. It is on the Nashua River near its entrance into the Merrimac River, and is served by several branches of the Boston & Maine Railroad and by electric interurban lines. Forty per cent of the population are French. In 1910 the population was 26,005; in 1920 it was 28,379.

Prominent features of the city are the Federal building, a United States fish hatchery, public library, Y. M. C. A. building, the Church of Saint Francis Xavier and Greeley Park (165 acres). The principal institutions are the Memorial and Saint Joseph's hospitals, the Hunt Home and Nashua Sanitarium. Power for manufacture is supplied by a three-mile canal extending from the Nashua River. The chief industrial establishments are cotton mills and manufactories of shoes, cards and gummed paper, asbestos, ice-cream freezers, refrigerators, furniture, hardware and saddlery. In 1920 there were 92 factories, employing $15,918,000 capital, and 8,264 wage earners.

Nashua was settled in 1655 and in 1673 was incorporated by Massachusetts as the township of Dunstable. The latter was reincorporated by New Hampshire in 1746. The present name was adopted in 1836, and the place became a city in 1853. The commission form of government was adopted in 1913.

NASHVILLE, Tenn., the capital of the state and the county seat of Davidson County, in population ranking next to Memphis among the cities of Tennessee. It is on the Cumberland River, mainly on the left bank, and on the Louisville & Nashville, the Nashville, Chattanooga & Saint Louis and the Tennessee Central railroads, and has electric interurban and steamboat service. Its location is central in the state, 186 miles south and west of Louisville, Ky., and 233 miles northeast of Memphis. In 1910 the population was 110,364; in 1920 it was 118,342 (7 per cent gain). Nashville has an area of about eighteen square miles and is situated on gently-sloping and hilly land which rises gradually westward from the river to an elevation of 560 feet. It is surrounded by the blue grass country, a fertile and picturesque section. The streets of the city are wide, and many of them are lined by beautiful old colonial homes.

Public Buildings and Parks. The principal building is the State House, situated on a hilltop in the center of the city, and constructed at a cost of $1,500,000. The surrounding grounds contain an equestrian statue of Andrew Jackson and the tomb of James K. Polk. Other noteworthy structures are the Federal building, which, with an addition, has cost $1,500,000; the courthouse, city hall and union station. In Centennial Park (the grounds of the Tennessee Exposition of 1897, which commemorated the admission of the state to the Union) stand the Parthenon and the History Building of the exposition, which was modeled after the Erectheum, and contains a museum and art gallery.

Nashville has many attractive parks, among them Glendale Park, south of the city, a place of great beauty; Cumberland Driving Park, Shelby and Watkins parks and the state fair grounds. In the national cemetery north of the town are the graves of 16,643 soldiers, among them 4,711 of the "unknown dead." In Mount Olivet Cemetery is a beautiful Confederate soldiers' monument; also the graves of 2,000 Confederate soldiers are here.

Institutions. Nashville is one of the chief educational cities of the South. Among its schools of importance are Vanderbilt University (which see); Peabody College for Teachers; the medical and dental departments of the University of Tennessee; Knapp School of Farm Life (which see); Fisk University for colored students (which see); Meharry Medical College (colored); Walden University (Methodist Episcopal) (colored); Roger Williams University (Baptist) (colored); Boscobel College, for women (Baptist); Ward-Belmont College, for women (Presbyterian); Saint Cecilia Academy, for women (Roman Catholic); and Buford College for Women.

The state library contains 40,000 volumes; the Carnegie Library building, a fine structure costing $100,000, contains 94,000 volumes. Watkins Institute has the Howard Library of 10,000 volumes, and valuable collections, manu-

scripts, portraits, etc., of the Tennessee Historical Society. Other prominent institutions of the city include the Galloway Memorial Hospital, Saint Thomas's Hospital, the Tennessee Industrial School, the Tennessee Reformatory for Boys, the Tennessee School for the Blind, the Confederate Soldiers' Home, the state penitentiary, and six miles from the city, the state asylum for the insane.

Industries. Nashville is one of the ten chief flour-milling centers and one of the greatest hardwood markets in the country, ranking second among industrial cities in the state; there were 391 factories in 1920, employing $44,422,000 capital. Flour mill and gristmill products and lumber and woodworking products are the principal articles of manufacture. Among other articles manufactured are stoves, tobacco and snuff, cigars, fertilizers, boots and shoes, clothing, pottery and automobiles. In the city are the large publishing houses of various religious organizations. There are important wholesale interests in groceries, dry goods, boots and shoes and drugs, and the city has an extensive trade in cotton, lumber, grain, fruit, vegetables and manufactured goods.

History. The city was settled in 1870 by a band of pioneers led by James Robertson, and until 1784, when it was incorporated under its present name, was called Nashborough, in honor of Governor Abner Nash of North Carolina. It was constantly harassed by Cherokee and other tribes of Indians during its early history. In 1806 it was chartered as a city; from 1812 to 1815 it was the seat of the state legislature; and in 1843 became the permanent state capital. In 1862, during the War of Secession, Nashville, which had been occupied by Confederate troops, was captured by the Federals, and in 1864 was the scene of one of the severest battles of the war. On March 22, 1916, a great fire caused a property loss of $1,500,000. Nashville has been the home of many prominent men, among whom are Andrew Jackson, James K. Polk, General Sam Houston and Thomas H. Benton. *The Hermitage,* Jackson's old home, is ten miles east of the city. The commission form of government was adopted in 1913. The waterworks and street electric-light plant are owned by the municipality. M.W.

Consult *Historic Towns of the Southern States,* edited by Powell.

NASMYTH, *na'smith,* JAMES (1808-1890), who invented the steam hammer with which his name is everywhere associated, was born in Edinburgh, Scotland. The invention of the steam hammer was actually made in 1839, and although claims have been put forward in favor of a hammer found in Schneider's Creuzot works, it is conceded that Nasmyth deserves the full credit of the invention. The trend of his genius was manifest at an early age, and he soon became proficient in the use of mechanical tools.

His genius did not hamper his business career, his character combining a love of his work and sound business methods. So successful was he that in 1856 he retired with an ample fortune. Many improvements in machinery are due to the ingenuity of Nasmyth, while he invented many entirely new appliances, among which were a planing machine, a nut-shaping machine, a steam pile driver and various hydraulic machines. Nasmyth's principal recreation and amusement after retiring from business life was the study of astronomy. He died in London.

NAST, THOMAS (1840-1902), an American caricaturist who won his greatest triumphs through his political caricatures dating from 1871 to 1873, when he was influential in breaking up the notorious Tweed "ring" of New York City. He was the originator of the "Tammany tiger," the "Republican elephant" and the "Democratic donkey," political symbols that are still current. Nast was born in Bavaria and was brought to America when six years of age. At the age of fourteen he was employed as draftsman on *Frank Leslie's Illustrated Newspaper,* and later made sketches for papers in New York, London and Paris, during the Italian war of liberation. As a member of the staff of *Harper's Weekly,* however, he did his best work. In addition to his caricatures, he also did creditable work in oil, notably scenes from the War of Secession. For many years he published *Nast's Almanac,* illuminating the text of various authors with his own strong illustrations.

NASTURTIUM, *nas tur'shum,* a genus of South American plants, one species of which is a favorite in American gardens. This is the trailing or climbing nasturtium, whose brightly-colored blossoms of varying shades of yellow, orange or red are so effective in flower beds and borders. Some flower gardens are planted to dwarf varieties of this species. The nasturtium flower has a very interesting structure. There are five sepals, the three upper ones being so joined as to form a long spur which holds the nectar. There are likewise five petals; the three lower ones are somewhat away from the

two upper and grow on long, fringed claws. The leaves are almost round, and as they grow close together, even overlapping one another a little, they form a dainty green retreat for the flowers. The plant has a pungent juice and the flowers and leaves are sometimes used in making salads, while the green seed pods are pickled in vinegar and eaten as a substitute for capers (see CAPER).

NASTURTIUMS

The nasturtium thrives best in a light, rich soil, with an abundance of light and sunshine. In temperate climates the seed is sown early in April.

NATAL, *na tahl'*, a colonial possession of Great Britain, one of the four original provinces of the Union of South Africa (which see). It is situated on the southeastern coast of Africa, northeast of Cape Colony and south of the Transvaal, with the Drakensberg Mountains on its western border. The Buffalo and Tugela rivers were formerly the northeastern boundary, but by the annexation of Zululand in 1897 and the districts of Vryheid, Utrecht and part of Wakkerstroom in 1903, the territory has been extended to the borders of Portuguese East Africa and Swaziland; the total area is estimated at 35,019 square miles, nearly three-fourths the area of England. The climate is healthful and the soil is fertile, producing vigorous vegetation, and timber trees grow in abundance. Grain and vegetables of all descriptions, sugar cane, tobacco and a variety of tropical fruits have been extensively cultivated, but the principal crop everywhere is maize, two crops being produced annually.

The settlement of Natal by the whites has tended to exterminate most of the larger animals native to the country, but the hippopotamus still frequents the streams, and leopards, hyenas, tiger cats and panthers are numerous in the forests and jungles. The products of rich gold fields, extensive coal mines and large sugar cane districts, with wool, form the chief exports, the last named being by far the largest. The longest tunnel in South Africa has been bored in this district, and the colony has over 1,050 miles of railway and good telephone and telegraph facilities. The only good port and the largest town is Durban, or Port Natal. The population in 1921 was estimated at 1,250,000, of whom about four-fifths were natives of South Africa, mainly Zulu-Kaffirs; the Europeans number between 130,000 and 135,000, and the East Indians and other Asiatics about 133,000.

Vasco da Gama landed at Port Natal in 1497 on Christmas Day, sometimes called the "Feast of the Nativity," hence the name "Natal." The Boers of Cape Colony, who emigrated to escape British rule, organized the Republic of Natal in 1839, but in 1843 the British annexed the country to Cape Colony, and it was erected into a separate colony in 1856. It suffered severely in the South African War (see SOUTH AFRICAN WAR). Since 1910 Natal has been under an administrator who is appointed by the Governor-General in Council and indirectly represents the king. The city of Pietermaritzburg is the capital. J.S.C.

Consult Russell's *Natal: The Land and Its Story.*

NATCHEZ, MISS., the county seat of Adams County and a noted shipping point for cotton, many thousands of bales being shipped from this point annually. It is on the southwestern border of the state and on the Mississippi River about 100 miles southwest of Jackson, the state capital. Railway service is provided by the Yazoo & Mississippi Valley, the Natchez & Southern, the Saint Louis, Iron Mountain & Southern and the Mississippi Central railways, and there is steamer communication with all Mississippi River ports. In 1920 the population was 12,608. The area is three square miles. Natchez is built for the most part on a bluff which rises about 150 feet above the river, and from this elevation a magnificent view is had of the surrounding fertile country. Here also are the elegant residences and public buildings, the lower narrow strip along the river front being largely used for shipping.

The county courthouse, the city administration buildings and Institute Hall are noteworthy buildings. Natchez has the Fisk Library, Agnes Z. Carpenter Public Library, Natchez Institute and Jefferson Military College. Features of interest are Memorial Park; the old estate of *Monmouth,* the home of General Quitman; *The Briars,* the girlhood home of Varina Howell, who was the wife of Jefferson Davis; *Somerset* and *Oakland,* the possessions of the Chotard family; and a national cemetery just outside the city limits. The industrial

prosperity of Natchez is largely dependent on cotton. There are cotton mills, a cotton compress and cottonseed oil mills, the first cottonseed oil mill in the United States having been built here in 1834. Besides cotton, considerable rice, sugar cane and produce are shipped.

The site was occupied by the Natchez Indians, for whom the place was named, when Le Moyne de Bienville built Fort Rosalie there in 1769. In 1729 the village was almost totally destroyed and nearly all of the inhabitants were massacred by the Indians. The English took the place in 1763 and renamed it Fort Panmure. In 1779 it was taken by the Spanish, who held it until 1798, when United States troops took possession. In 1802 it became the capital of the Natchez District and Mississippi Territory, in 1803 it was incorporated as a city, and from 1817 to 1821 it was the state capital. A tornado swept the city in May, 1840, causing considerable damage. The year after its bombardment in the War of Secession (1862) it was taken by the Federals, who occupied it until the end of the war.

NATICK, *na'tik,* MASS., a town in Middlesex County in the eastern part of the state and on the Charles River, seventeen miles southwest of Boston. Transportation is provided by the Boston & Albany Railway and by electric lines. Natick in 1920 had 49 factories of all kinds, employing 1,630 wage-earners and $6,712,000 capital. Besides the public schools, the town has Walnut Hill School, for young ladies, the Bacon Public Library and the Morse Institute, containing a public library and reading room. Features of interest are a monument to John Eliot and a soldiers' monument. Lake Cochituate, one of the sources of Boston's water supply, is in the northwest part of the town; one of the parks has a bathing beach. The people show with pride the shoe shop where Henry Wilson, who was later chosen Vice-President of the United States (1872), worked as a cobbler. Natick was organized as a home for converted Indians by John Eliot in 1651; their old burial ground is an attractive feature of the place. The town was incorporated in 1781. Its population in 1910 was 9,866; in 1916 it was 10,102 (Federal estimate).

NATIONAL ACADEMY OF DESIGN, an institution founded in New York City in 1826, the schools of which are open from October to the middle of May. Instruction is given in a variety of art subjects, including life, still life, antique painting, anatomy, etching, composition and coin and medal engraving, and prizes are awarded for meritorious work at annual exhibitions. The Academy has an average enrolment of from 200 to 300 students. The institution was affiliated with the Metropolitan Museum of Art and with Columbia University in 1906, and in the same year it effected a union with the Society of American Artists.

In 1802 an Academy of Arts was organized in New York, but the famous historical painter, John Trumbull, was the only recognized artist among its members. A new society was formed in 1826, called the New York Drawing Association, and two years later the name *National Academy of Design* was adopted. Prof. S. F. B. Morse, the inventor of the telegraph, was an influential member and twice served as president. At the present time the governing body of the academy is a council composed of its officers and six members.

NATIONAL ACADEMY OF SCIENCES, an organization incorporated by act of Congress on March 3, 1863. When called upon to do so by any department of the United States government, the Academy makes experiments, conducts investigations, reports on any specified subject of science or art and answers any questions submitted to it; the expenses are defrayed from appropriations made for the purpose. The Academy holds in Washington, D. C., a stated session each year, beginning on the third Monday in April, and an autumn meeting is also held at such time and place as the council determines. Special meetings may also be called when occasion demands it. The original membership was limited to fifty, but there are now about 142 honorary members and forty-one foreign associates. The former must be citizens of the United States. Each year there are published *Proceedings* of the meetings.

NATIONAL CIVIC FEDERATION, a joint organization of the representatives of capital and labor in the United States, whose object is the lessening of industrial strife. The federation has from the first emphasized the importance of arbitration, and has furnished a sort of forum for the discussion of the grievances of labor and of desirable legislation. Separate departments devote their attention to such problems as immigration, wages, the open and closed shop, strikes, lockouts, trade agreements and so on. A welfare department concerns itself with bettering the living condition of the worker.

The organization came into being in New York City in 1900, following a series of conferences held there and in Chicago. Many of the

most eminent men in the country interested themselves in the project, and it included in its membership such men as Grover Cleveland, Charles W. Eliot and Archbishop Ireland, besides large employers of labor, like John D. Rockefeller, and labor leaders, like Samuel Gompers and John Mitchell. While the influence which the organization has been able to exert has hardly justified the most optimistic hopes of its founders, the federation has undoubtedly played its part in producing a better understanding between capital and labor.

NATIONAL CONGRESS OF MOTHERS AND PARENT-TEACHER ASSOCIATIONS. With the earnest purpose of promoting better opportunities for all children a group of persons met in Washington February 17, 1897. Mothers, fathers, educators, clergymen and statesmen were there, but the central figures of that great Congress were Mrs. Theodore W. Birney and Mrs. Phoebe A. Hearst, both of them mothers, and both women of broad outlook on social conditions and needs. Both had reached the conclusion that the foundation of civic and social betterment could be reached by more intelligent, comprehensive care of children. It was the first time in history that mothers of a nation had been called together to consider their own responsibilities as mothers and the relation of the home to civic and social life.

The objects of the National Congress of Mothers and Parent-Teacher Associations then organized and incorporated were thus stated in the constitution:

> The objects of this Congress shall be to raise the standards of home life; to give young people opportunities to learn how to care for children, so that when they assume the duties of parenthood they may have some conception of the methods which will best develop the physical, intellectual and spiritual nature of the child; to bring into closer relations the home and the school, that parents and teachers may coöperate intelligently in the education of the child; to surround the childhood of the whole world with that wise, loving care in the impressionable years of life that will develop good citizens; to use systematic and earnest effort to this end through the formation of Parent-Teacher Associations in every public school and elsewhere, through the establishment of kindergartens, and through distribution of literature which will be of practical use to parents in the problems of home life; to secure more adequate laws for the care of blameless and dependent children, and to carry the mother love and mother thought into all that concerns childhood. The Congress believes that, with the aid of Divine Power, these objects will be accomplished.

First of all, the Congress placed emphasis on home life, for every child comes into some kind of a home, and the influences for good or evil are never forgotten. The Congress set for its primary work the raising of the standards of every home to best fit the requirements of infancy, childhood and youth. That meant education of parents in child nurture, in all that conduces to the best kind of a home. It meant reaching every home with the knowledge which is essential in good home making. The Congress saw children suffering from parental ignorance concerning health, foods, physical, mental and spiritual growth and methods which best promote each. It saw parents craving more light, but with no means offered for satisfying the craving. It assumed the task of supplying this need of parents and children.

The Congress saw teachers who were sharing with parents the guidance of children, yet since neither was in communication with the other, the task of both parents and teachers was made the more difficult, and the children suffered by this lack of mutual understanding and coöperation.

The Congress saw the majority of children coming under school jurisdiction, and through the well-systematized school system it discerned the way to open the opportunity for home education to parents, and at the same time secure intelligent coöperation of home and school through the establishment of a Parent-Teacher Association in connection with every school.

The National Congress of Mothers assumed the work of organizing these associations, and it also assumed the permanent function of the educational direction of the home education work of all these associations, which would make them of real value to parents wherever they might be, insure their continuance and keep them true to their fundamental, far-reaching purpose. The Congress saw what to the mother heart seemed gross neglect of dependent, orphan and erring children. It saw children in prisons and jails in every state; it saw children associated with criminals in all court procedure; it saw no discrimination between the offenses of children and adults and no adequate provision for helping them. To put mother love and mother thought into the solution of these conditions and to ask Divine guidance in the great work of guarding and guiding little children was one of the objects to which the Congress pledged itself.

Comparatively little attention had been given to protecting legislation for all phases of child welfare before 1897. In changing this condition the National Congress of Mothers has wielded

a mighty influence. The Congress did not originate the juvenile court and probation system, but it saw its advantages and worked for years to establish the juvenile court and probation system throughout this and other lands, conducting a systematic propaganda which was successful in many places. Then, by practical experience of mothers in the juvenile court, detention houses in the place of jails were promoted, and the placing of the probation work on a foundation which required a knowledge of child nurture as a qualification for such service became a feature of the Congress work.

The breaking up of families through poverty or death or desertion of one parent next engaged the consideration of the Congress, and the movement for the mothers' pension was inaugurated and has been promoted with ever-increasing success. This has won the support of many thinking men and women, and also judges and legislatures, and to the Congress is due the enactment of a pension law in some states, while in all states the Congress has given its support to the pension movement. Its advantages in economy and efficiency have already been proved.

There was no child-labor committee in existence when the National Congress of Mothers inaugurated the movement to regulate the employment of children in mines and factories.

The Congress has urged that a Department of Child Hygiene in every board of health be established, the primary work being saving babies by education of mothers in infant hygiene. It also has urged that a child welfare department in city and state be appointed to study all conditions affecting childhood, to report to governor and legislature, with a view of perfecting the protection and development of children.

The National Congress of Mothers and Parent-Teacher Associations secured the extension of the educational work of the National Bureau of Education and is responsible for the first recognition of parents as educators. The Home Education Division was opened in the Bureau of Education in September, 1913. Children's education begins at birth, and parents have eight times the educational work that is given to teachers. To help the home to give intelligent care and guidance to children is the work of the Home Education Division.

Through the Home Education Division of the Bureau of Education, which is supported almost wholly by the National Congress of Mothers and Parent-Teacher Associations, three distinct types of work are being done:

1. The Bureau is promoting in a very effective way the organization of parent-teacher associations throughout the country and doing much to make them more effective.

2. It is assisting mothers of young children and prospective mothers by personal correspondence, multigraphed letters and bulletins on the care of babies. Between fifty and sixty thousand mothers have beeen reached in this way.

3. Through its reading courses, several of which have been issued and three others are now in preparation, it has promoted good reading among boys and girls and men and women throughout the country. About 120,000 copies of the several courses already prepared have been distributed. More than 4,000 readers are registered. These readers are found in every State in the Union, in Hawaii, Porto Rico, Canada and China. The readers in foreign countries are of course Americans who live there. State library commissions are giving support in all of the states in which there are such commissions. City libraries are buying the books of previous reading courses in larger numbers so as to be able to supply the demand for them. Circulating libraries in some states are doing the same. The libraries also advertise the courses. Many of them post the courses where they can be seen by their readers. This is also done in many high school libraries. It has had a good effect on the supplementary reading of high school boys and girls.

Up to 1917 three international conferences on the welfare of the child had been held in Washington, D. C., the invitations having been sent to all nations by the Department of State. National child welfare conferences have been held annually, and annual state child welfare conferences have awakened every part of the country to the many needs of the children which must be met by home, church, school and state. See PARENT-TEACHER ASSOCIATIONS. H.K.S.

NATIONAL DEBT, the total of the money owed by a nation to individuals, corporations or to other governments, contracted as a result of wars, for territorial expansion, or to meet deficits when receipts from all usual sources do not equal expenditures.

Nations began over two hundred years ago to contract public debts, and in this Great Britain led. Previous to 1688, when the government of that country needed money, the king gave his personal pledge, secured by his jewels, for its repayment; but the revolution of that year made necessary other devices, and the credit of the whole nation was substituted, based upon acts of Parliament. Other nations soon began to employ like means to get money to meet emergencies, and to-day practically every civilized country has a standing indebtedness, not excepting even careful, frugal Switzerland.

Political economists have uttered warnings because of the continual increase in public debts;

Adam Smith prophesied before the year 1790 that the enormous obligations they assumed would eventually ruin European countries; today the nations owe ten times as much as in his day, and there is no indication that his warning had a logical basis.

United States Debt. After the Revolution the young nation was in debt for expenses incurred by Congress to carry on the war, and it also assumed the war debts of the thirteen States. Thus, in 1791, the national debt was $75,463,746.52. It increased to nearly $87,000,000 in 1804, then decreased gradually until the second war for independence. That conflict left a debt of $127,334,933.74 in 1816, but by 1835 the country was so nearly free from indebtedness that it owed only $33,733.05. Not since then has it been so low; the Mexican War increased it, and the War of Secession raised it to the tremendous total of $2,773,236,173.69 in 1866. By 1893 this was reduced nearly one-half, which means that the reduction during this time averaged $5,185 for every hour of the intervening twenty-seven years. After 1893 the debt began to increase, and in 1912 again passed beyond its highest war total, with a new record of over $2,868,000,000, due to large expenditures for the Spanish-American War, to resulting increase in the pension roll, to lavish expenditures for public buildings and for river and harbor improvement, and for the construction of the Panama Canal. When the United States entered the War of the Nations, in April, 1917, the unprecedented cost of quick preparation for the conflict increased the country's expenditures to previously unheard of sums. A part of this expense was raised by various taxes, principal among which were greatly increased income taxes, but most of the money was acquired by the sale of Liberty Bonds and Victory Bonds, each bond sold representing an increase in the national debt. The country's short participation in the war cost about twelve times the entire financial burden entailed by four years of civil war (1861-1865). The public debt for various years since 1860 is given in the table:

YEAR	AMOUNT	YEAR	AMOUNT
1860..	$ 64,842,287.88	1895..	$1,676,120,983.25
1863..	1,119,772,138.63	1900..	2,136,961,091.67
1864..	1,815,784,370.57	1910..	2,652,665,838.04
1865..	2,680,647,869.74	1913..	1,028,564,000.00
1866..	2,773,236,173.69	1916..	3,609,244,262.16
1870..	2,480,672,427.81	1917..	5,717,770,279.52
1875..	2,232,284,531.95	1918..	12,672,510,972.65
1880..	2,120,415,370.63	1919..	25,672,000,000.00
1885..	1,863,964,873.14	1920..	24,062,510,000.00
1890..	1,552,140,204.73	1921..	23,992,000,000.00

Canada's Debt. The public debt of Canada was created in 1867 by the formation of the Dominion, which assumed the liabilities of the separate colonies to a total of $92,500,000. Unlike the United States and most other countries, Canada has had no great wars to burden the population with a large and sudden increase in the national debt. There has been, however, a steady growth, due chiefly to expenditures for internal improvements of all kinds, including the construction of public works, canals and railways, and to cash subsidies to railways. The participation of Canada in the War of the Nations added very largely to its debt. The following table shows the increase:

YEAR	DEBT	YEAR	DEBT
1870	$ 115,993,707	1912	$ 508,333,592
1880	199,125,323	1913	544,391,000
1890	286,112,297	1914	544,391,369
1900	346,206,980	1915	700,473,814
1910	470,663,046	1918	1,300,000,000
1911	474,941,487	1919	2,250,000,000
		1920	2,276,000,000

In Other Countries. France had the largest national debt of any country in the world when the War of the Nations began in 1914. To the credit of the nation it can be said that it was very largely owed to French citizens, who have always been notably thrifty and always able to respond to government calls for loans. The great war embroiled over twenty nations, and the debts of each increased at an appalling rate. A correct statement of the total debt of each European country could not be published in 1919. In 1920, Great Britain owned over $37,910,000,000; Germany, $71,000,000,000; France, $50,960,000,000; Italy, $18,330,000,000; Russia, $25,500,000,000. These sums are at prewar currency values.

After the war it was feared that Germany would repudiate its debt; no indication of such a probability has yet appeared; the new government's first task was to make peace and put down local revolutions, and the financial rehabilitation of the country was postponed, with disastrous decline of currency values.

NATIONAL EDUCATION ASSOCIATION. see subtitle, in article EDUCATION, page 1952.

NATIONAL GUARD, volunteer defense forces of the several states of the American Union. See MILITIA.

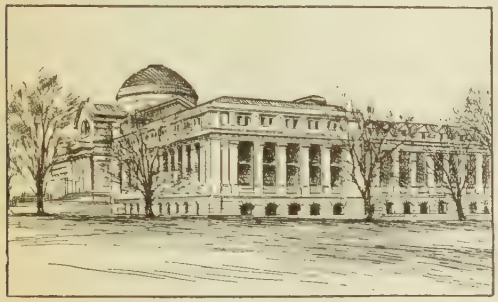
NATIONAL HYMNS. See HYMNS, NATIONAL.

NATIONAL MUSEUM OF THE UNITED STATES, a government collection of antiquities, scientific specimens, etc., at Washington, D. C., under the control of the Smithsonian Institution. In 1876 the Smithsonian authori-

THE RAINBOW BRIDGE, UTAH

This mammoth arch measures 309 feet in height, 277 feet in width and averages 30 feet in thickness. Bright with the colors of sunset and beautiful hues of the rainbow, this graceful arch spans the canon. Date of discovery, 1906. Not over 1000 white people have ever seen it. One of the world's greatest natural wonders.

ties chose from their very large supply a large number of relics and specimens to be exhibited at the Centennial Exposition in Philadelphia. This collection was arranged chonologically to show the history and development of the United States and was one of the most interesting departments of the Exposition. In 1877, when the exhibit was returned to Washington, the Smithsonian Institution was so crowded that no room could be found for the collection, and it



BUILDING OF THE NATIONAL MUSEUM

was therefore stored until Congress could take action. That body authorized the erection of a building for the exhibit in 1879, but in 1881, when the edifice was completed, it was found to be too small. In 1903 Congress ordered the construction of another large building, costing $3,500,000.

From the standpoint of history and patriotism the National Museum is of great value, for within its walls are stored innumerable mementos of American presidents, statesmen, soldiers and literary men, while the natural history specimens and the articles arranged to show the customs and manners of all races are probably not equaled in interest by any other existing exhibit. The secretary of the Smithsonian Institution is keeper of the Museum; he is aided in this work by an assistant secretary and over twenty chiefs of departments. The Museum has issued numerous valuable bulletins in zoölogy, botany and geology, which are distributed through the Superintendent of Documents of the Government Printing Office.

NATIONAL ROAD. See CUMBERLAND ROAD.

NAT TURNER INSURRECTION, *in sur ek' shun.* Nat Turner was an American negro slave, born in Southampton County, Va., in 1800. While but a child he fancied himself to be God's agent for some great work and watched for some sign which would indicate what the deed should be and when it should be performed. In 1828 he declared that a voice had told him to rise against the enemies of the negro race and slaughter them without mercy. Turner thought the eclipse of the sun in February, 1831, furnished him the sign for which he had so long waited, but he did not begin his "mission" until August 13.

On that date he assembled five other negroes, explained his plans, and on the night of August 21 killed five members of his master's family at Cross Keys, Va., and the next morning put to death all the pupils in a neighboring school. He compelled other slaves to join him, and by noon of August 22 was leader of a wild group numbering fifty-three. They went from house to house killing every white person they found, until their victims numbered fifty-seven. Before evening of that same day a great mob of white men were hunting the murderers, and were soon joined by United States troops and militia. The negroes were captured in October, were tried at Jerusalem, Va., and seventeen, including Turner, were hanged there on November 11. The massacre resulted in the immediate passing of more stringent slave laws in nearly every Southern state, free negroes were driven from many sections, and practically all State and Church efforts toward educating the colored race were temporarily halted in the South.

NATURAL BRIDGE, a structure created by the hand of Nature, which takes the form of a mass of earth or rock spanning a stream, gorge or other depression. In many instances a natural bridge is the result of the action of water which works its way slowly through loose soil or soft rock beneath a harder layer, gradually washing out the softer material. The solid upper layer is thus left a natural bridge. There are more than fifty of such interesting formations in the United States. Of these the best known is in Rockbridge County, Va., sixteen miles from Lexington, Va. It is from fifty to one hundred feet wide, affording a comfortable passageway for traffic, is 215 feet above the stream below, and has a span of ninety feet. The thickness of the bridge is about forty feet. Originally the structure was a natural tunnel, but as water continued to percolate through the rocks the softer portions were loosened and all of the roof except this bridge portion collapsed many years ago.

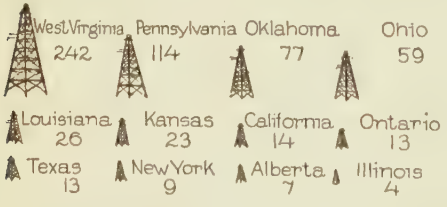
In Utah there are three remarkable natural bridges, all of which are pictured in these volumes in connection with the article UTAH. They are the Nonnezoshi, 308 feet high; the Edwin, 111 feet in height, and the Augusta Sandstone, 265 feet high. Other notable struc-

tures of this nature are found in Powell County, Ky.; Winston County, Ala.; Santa Cruz County, Cal., and elsewhere.

NATURAL BRIDGE, VIRGINIA

NATURAL EDUCATION. See subtitle, in article EDUCATION, page 1929.

NATURAL GAS. The first white men who crossed the Alleghany Mountains were taken by the Indians to places where gas was issuing from crevices in the rock. The Indians set the gas afire and then worshiped before the flames.



ANNUAL PRODUCTION

The average yearly yield for five years appears in the above graphic illiustration.

Some of the first oil wells sunk in Pennsylvania were forced through rock containing this gas. It was under high pressure and it sometimes flowed with such force as to throw the drill from the well. If it were accidentally ignited the flame extended high into the air. The gas known to the Indians, and later discovered in large quantities by those sinking wells for petroleum (which see), is now known as *natural gas.* It has about the same composition as illuminating gas and produces about the same amount of heat per 1,000 feet, but it does not give as good light. When first discovered, natural gas was considered an annoyance, but men soon learned that it was a valuable fuel, and its extraction from the earth is now an important industry. Natural gas occurs in regions where petroleum is found, and it is procured by sinking wells (see WELL BORING). The wells vary from a few hundred to three thousand or more feet in depth. The pressure in a new well may be as high as 1,000 pounds to the square inch, but usually it is less—500, 400 and 250 pounds and under being common. As the gas continues to flow the pressure decreases, and the flow from some of the oldest wells has ceased, showing that the gas is a product of some past geological age, and is not now being produced.

Production and Uses. The extraction of natural gas constitutes to-day an important industry in the United States. The chief producing states, in the order of their importance, are West Virginia, Pennsylvania, Oklahoma, Ohio, Louisiana, Kansas, California, Texas and New York. The annual production of natural gas for any recent ten-year period has amounted to about 592,000,000 thousands cubic feet, valued at $94,000,000. One-third of the production is used for lighting and heating purposes in the homes of the people, for there are in the United States nearly 2,100,000 domestic consumers of natural gas. The remainder is supplied to industrial establishments, including iron mills, steel works, lead and zinc smelters, glass factories and brick factories, where it is used in place of coal. Natural gas is now carried by pipe lines from the source of extraction to many distant places. By a recently discovered method gasoline is manufactured from natural gas, which is becoming a most important source for supplying this very necessary commodity of modern life.

Production in Canada. Over 21,500,000 thousands cubic feet of natural gas, valued at $5,100,000, were extracted in Canada in 1921. Two-thirds of the amount is produced in Ontario and one-third in Alberta. There are three principal producing fields in Ontario, known as the Welland County, the Heldimand-Norfolk and the Essex-Kent fields. A large, deep reservoir

of natural gas was found in 1913 in the Petrolia oil field. In Alberta natural gas has been obtained from the two fields, known as Medicine Hat field, which has been producing since 1891, and the Row Island field, which has been producing on a large scale since 1912. Natural gas from this field is supplied to Lethbridge, Calgary and other towns of the district. W.F.R.

NATURALIZATION, *nat u ral i za' shun,* the legal process by which a person becomes a citizen of a country other than that of his birth. Though the details of form vary in all countries, a man who becomes naturalized always renounces allegiance to his native land and takes an oath of allegiance to his adopted country. In all countries a married woman and minor children are regarded as citizens of the state to which the husband and father owes allegiance. Thus naturalization of a man changes the citizenship of his wife and minor children. Unmarried men and women, however, of legal age, become naturalized in the usual way. In countries where military service is compulsory, men are not allowed to emigrate and renounce their allegiance unless they have served their time bearing arms, or have secured special permission from the government. Occasionally a man escapes without performing his service, but if he ever returns he is still liable to service, and in some instances is subject to imprisonment or heavy fine.

The whole theory of naturalization is, indeed, a modern development. Until the nineteenth century a man was a citizen of his native land regardless of where he lived, and the old maxim of the common law, "Once an Englishman, always an Englishman," had its counterpart in the law of practically every civilized nation. One of the causes of the War of 1812 was the British impressment of seamen who were of British birth but of American citizenship. It was not until 1870 that Great Britain formally renounced the old principle and recognized the right of individuals to transfer their allegiance. All the principal nations of the world, except Turkey, have enacted laws which provide for the naturalization of foreign-born persons.

In the United States. The naturalization of Chinese is prohibited by a law of Congress, and the courts also refuse naturalization to Japanese, Hawaiians and natives of India. Any alien (which see) who is a white person, or of African birth or descent, if he desires to become naturalized, must file a declaration of his intention with the clerk of the United States District Court or any state or territorial court of record which has jurisdiction over the residence of the applicant. This declaration must state the name, age, residence, occupation, time and place of arrival in the United States, and it must state the applicant's intention to renounce allegiance to every foreign potentate or state, and particularly to the one of which he may be a subject or a citizen. The filing of this declaration is called "taking out first papers." Children born abroad of United States citizens are themselves citizens and need not be naturalized.

Final Papers. Not less than two years after the filing of this declaration, and after not less than five years of continuous residence in the United States and one year in a state, the applicant may petition for his "final papers," a certificate of naturalization. The petition must be written in English by the applicant, and must state his name, age, birthplace, name of his wife (if he is married) and a number of other facts. The petitioner must declare himself not opposed to organized government; he must not be a polygamist or a believer in polygamy. The facts of his residence for five years and his general character must be verified by the testimony of two citizen witnesses. These petitions are heard by the court in open session not less than ninety days after the petition has been filed, and not less than thirty days before a general election. Aliens who have been honorably discharged from the army, or have served four years in the navy, may become naturalized without filing the first declaration of intention. An alien who becomes naturalized must speak English (if physically able) and must renounce any title of nobility or membership in any foreign orders. A fee of one dollar is required when the declaration of intention is filed and another fee of four dollars when the petition for final papers is heard by the court.

Rights of Naturalized Citizens. After naturalization a foreign-born citizen has all the rights and privileges of a native-born citizen, except that he can never become President of the United States. If he travels abroad he is entitled to the same protection given to native-born Americans. The right to vote is not, however, derived from the Federal government. This is a right granted by the state, and nearly half the states allow a foreigner to vote after he has officially declared his intention of becoming a citizen.

In Canada and Other British Dominions. Naturalization as a Canadian citizen involves naturalization as a British subject. Since Janu-

ary 1, 1915, every person to whom a certificate of naturalization is granted is a British subject, not only in Canada, but also in the United Kingdom and in any other British territory. Persons naturalized before 1915 can apply for new certificates valid in any part of the British Empire. Before he is eligible for naturalization in the British Empire, an alien must be in residence for five years; if he wishes naturalization in Canada or Australia he must be a resident of the Dominion or the Commonwealth for a year preceding his application.

Section 24 of the act respecting naturalization of aliens makes the following limitation:

> An alien to whom a certificate of naturalization is granted shall, *within Canada,* be entitled to all political and other rights, powers and privileges, and be subject to all obligations, to which a natural-born British subject is entitled or subject within Canada, with this qualification that he shall not, when within the limits of the foreign state of which he was a subject previously to obtaining his certificate of naturalization, be deemed to be a British subject, unless he has ceased to be a subject of that state in pursuance of the laws thereof, or in pursuance of a treaty or convention to that effect.

Aliens may also become British citizens by special act of Parliament. Prince Albert was thus naturalized when he married Queen Victoria. An alien woman who marries a British citizen thereby acquires British nationality and requires no formal naturalization; in this manner many American women have become British subjects.

In Other Countries. In Belgium and Russia a residence of five years is required preceding naturalization; in France, Sweden and Greece, three years; in Argentina two years, and in Portugal one year. In Austria a residence of ten years in itself entitles an alien to all the rights of citizenship, but in Germany there is no fixed period of time. Naturalization in Germany is under the control of the central administrative authorities, dominated by the military power of the empire. An applicant must show that he is legally free to change his nationality, or if he is a minor, that he has permission from his father or guardian. He must, moreover, possess an income sufficient to support him or be engaged in a legitimate business or profession. A Turk who wishes to become naturalized elsewhere must not only secure permission from the sultan's government but must agree never to return to Turkey. W.F.Z.

NATURAL SELECTION, the theory, first advanced by Darwin, that "New species may result from the selective action of external conditions upon the variations from their specific type which individuals present." When Darwin's book, *The Origin of Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life,* came out in 1858, it gave the word *evolution* a new meaning; it advanced a theory as to how all living things came to have their present form, for the theory applies to the highest as well as to the lowest, to men and to all forms of animal and vegetable life.

Selection by Life and Death. All living creatures are prolific—that is, they tend to produce a great many young of their own kind. If all the young of the various species were to live and produce still more young, the world would speedily become overcrowded. There are so many more individuals born than can possibly survive, because of limitations of space and food, materials for shelter, and so forth, that the very slightest advantage of one over the other may keep the one alive and kill the other. Thus Nature, working as a ruthless force to keep the world habitable, accomplishes the purpose by killing off the weak, or those forms which are not adapted to the conditions under which they must live if they survive, and by favoring the others.

Young of the same parents, in all forms of life, differ more or less widely. These variations, slight as they are, tend to be inherited; if the variation is such that it hinders or incapacitates, the species becomes extinct; if it is in the direction of increased fitness, it becomes a characteristic of a surviving species. So it seems that all forms of life are fighting, usually without realizing it, for a chance to live. This fight has given rise to two phrases, "the survival of the fittest" and "the struggle for existence," by which Darwin meant not only that the individual must be successful in maintaining life under his conditions, but that he must leave young; otherwise, his species, composed of individuals with the variations and characteristics which have made him a survivor, will die out.

Arguments for Natural Selection. The above, of course, is only a theory. Many scientists differ from Darwin, and hold that though he has accounted for *preservation* he has not proved *origination* through his theory of natural selection. The majority of thinkers, however, are inclined to accept the Darwinian view, and since his time every effort has been made to get definite evidence in proof of his hypothesis. Darwin himself admitted that it is hard to

prove, and that it is only by observation of present forms and their fitness for their environment that we are able to believe in selection.

One of the most satisfactory proofs of the theory is the way that man is able, by breeding domestic animals, to produce characteristics which will make his animals more useful to him. All the domestic animals have wild ancestors: the wild boar has been domesticated into the pig; wolves, foxes and hyenas into dogs; horses, sheep and cattle were once wild creatures, and all fowls have been domesticated; once tamed, man's animals have been bred to produce specific traits for his convenience and use.

Another argument in favor of Darwin's theory is the importance of protective coloring in determining survivals. If green and brown moths of the same genus are exposed on brown grass, after a short time the green ones will have disappeared, eaten by birds, while the brown moths, rendered invisible by the similarity of their coloring to that of the grass, will survive.

Luther Burbank, whose production of new fruit and flower forms has seemed like magic, is a disciple of Darwin, and he puts his principles into operation. Eugenics, "the newest of the evolutionary sciences," is man's attempt to do for his own race what he has so long been doing for his plants and animals. See EUGENICS; EVOLUTION; BURBANK, LUTHER. A.C.

Consult Thomson's *Darwinism and Human Life;* Lloyd's *The Growth of Groups in the Animal Kingdom.*

NATURAL THEOLOGY, the system of theology which holds that God may be known through His works. In the eighteenth and nineteenth centuries it was considered to be directly opposed to the theology of revelation and to deny all that is miraculous and supernatural in religion. However, in the thought of to-day, in which both natural and supernatural are regarded as being subject to similar laws, Nature and the Bible are generally viewed as harmonious sources of knowledge, and the old contention has died out.

NATURE STUDY is a means of awakening in boys and girls an intelligent interest in the wonders and beauties of the world about them. The great naturalist Huxley once said that a person who knows little or nothing of natural history is to be compared to one who passes through an art gallery which has its pictures turned toward the wall. Such, indeed, is the lot of boys and girls who are permitted to go through school life with "eyes that see not" and "ears that hear not," in so far as the world of nature is concerned. Happily, modern educators have come to see that the systematic study of objects in nature should have a place in every school curriculum.

How the Idea Developed. So general is the conviction now that a part of every school day should be spent in studying the outdoor world by observation that it is hard to realize how much resistance this idea met with when it was first introduced, about the year 1885. Nature study was unknown before that time, although textbooks in natural history were not unfamiliar to the school children of that day. Once the idea was introduced, people for the most part held that it would be a mere waste of time to put this study into the school curriculum; that the school day was already all too short and that to introduce a new study was to take time which was needed for those *necessary* ones already established.

However, the best educators, who were fathering a larger educational movement away from "culture studies," so called, of which this was only one aspect, insisted on the importance of the new study. They contended that the end of education was not merely the acquiring of a certain amount of learning. They held that education had no right to the name unless it had for its purpose as well the preparing of men and women to live better. Children needed to be equipped for active, productive, joyous living as well as to be grounded in the elementary studies—reading, writing, arithmetic, etc. The

magazines for many years published articles and discussions of the new study. Gradually, because it was championed so stanchly by prominent educators, it began to gain ground. To-day it is an accepted part of regular work in most public schools.

The Value of Nature Study. Above everything else, nature study should give a child a sense of companionship with all out-of-doors, and with all living things. From these he will learn to appreciate color and form and sound. The thundercloud piled in the western sky, the flash of the robin's red breast, the down on the wing of a moth, the bird songs, the sound of rain on the roof and of the wind in the tree tops, the murmur of the brook—all these will be a real part of his world, for him to inquire into. For a child who acquires this sensitiveness to beauty, such stanzas as those from Jean Ingelow, printed on page 3319, will take on new meaning.

This sense of kinship with all living things should inevitably follow the study of nature. If it does not, then the study might better be abandoned. However, if there is in the teacher's heart a real love of nature, such results are not likely to occur.

The outdoor expeditions which form so important a part of nature study not only keep the child in the open air but also teach him how to occupy his time when he is in the open. Children who form a genuine interest in the subject are not likely to get into mischief. All children have a little of the vandal in them. A love for and interest in growing and living things will check this impulse to mutilate or to destroy.

Dr. Hall of Clark University once said: "Nature in its broad conception includes the fundamental subject matter of all education." Francis Parker expressed the same idea in other words. Both these highly-educated and intelligent men had a broad and noble conception of the value and purpose of education. They realized that in the immediate world about the child were all the materials for accomplishing this purpose. And it is true that nature study can be correlated with every other study the child takes up—with language and reading, with arithmetic, geography and history.

For instance, consider language work. Boys and girls dislike language exercises, as a rule, simply because they are not interested in the subject matter about which they write. If they are interested and can feel at the same time that anything they may have to say will be of interest to some one else, the language lesson will be robbed of its tedium. In their nature lessons they will have an unlimited source of interesting subject matter. A field notebook will furnish numberless language exercises without the pupil's being conscious of it. This notebook should be the pupil's exclusive possession and need not be shown to the teacher unless the child so desires. The observations put down in this notebook should not be corrected. Pointing out errors of grammar, punctuation and spelling would tend to check the pupil's freedom of expression.

If excursions are frequent (and they should be), it is probable that all the boys and girls will have a vivid interest in putting down an account of what they see and hear, but this account will lose most of its charm if the child becomes self-conscious. However, since pupils learn to write by actually writing, the exercise will be of sufficient value, even though mistakes are frequent—and they are bound to become less and less frequent as time goes on. Older pupils will get helpful suggestions from such writers as Ernest Thompson Seton, Thoreau and John Burroughs. Thompson Seton's books are embellished with marginal notes and illustrations which are particularly interesting and helpful.

The correlation of nature study and drawing is also inevitable. All boys and girls love to draw. For the very young pupil, drawing is a natural, though very crude, means of expression. As soon as this drawing is done under direction it loses a part of its value. The formal study of drawing must, of course, be done under direction, but it is not unlikely that the drawing done in notebooks or in nature study classes is of even greater value. Each pupil should be permitted to choose his medium for the work—pencil or pen and ink or water colors or colored crayons—and be allowed to draw anything that appeals to him as the subject for a picture. Most of the pictures produced will be poor, of course, but on the other hand, because the pupil is intensely interested, some will be surprisingly good. It is probable that with some pupils this spontaneous drawing will compare very favorably with that done in the formal drawing class.

In beginning work, geography and nature study are very closely interrelated. All geography study should begin with the home environment of the pupil, the outdoor world which he knows. Francis Parker in his book called *Talks on Teaching* explains fully his con-

cept of how the elementary studies which the pupil takes up can be correlated. He includes in this interrelation not only all of the natural sciences but the exact sciences as well—even arithmetic. Taught as a science of quantity, arithmetic can be developed as a corollary of almost any other subject. In the measuring of distance, computing areas, forming conceptions of numbers and quantities, arithmetic is constantly being used both in geography and in nature study. For instance, in a fly-breeding experiment, the boys and girls may work out, mathematically, the increase in the number of flies that result with each generation. In laying out gardens, measuring trees — their height, breadth and thickness—in counting seeds and in numberless other ways exercises are furnished which are all the more valuable because they are not labeled as arithmetic.

A garden, as such, is not necessarily a lesson in nature study, but it may be made one, if the boys and girls are taught what to plant and at what season, why seeds are planted in some cases and in other cases seedlings; or if they study the weeds which they uproot, and observe the harmful and the helpful insects and grubs. An interest in gardening may in some cases lead to a genuine interest in agriculture.

The Teacher. There is perhaps no study in the entire school course which requires greater ability on the part of the teacher. A leading authority on methods of teaching this fascinating subject demands no less of the teacher than this:

> "At least he must have the nature sympathy that every human soul needs to keep him near to his highest self: response to the sun and the wind and the rain; to starry night and moonlit wood; to brook and lake and ocean; to wayside flowers; to moss and fern; to the smell of plowed fields; to the mystery of a seed; to the glory of orchard in bloom or in harvest; to level sunlit cornlands; to far-reaching timothy fields; to the song of early birds; to the dawn of a new day."

In brief, the teacher must have, above all, a genuine love of nature. But she needs, of course, more than this; she must have accurate knowledge. This need not be obtained through formal study. Many a teacher with the habit of accurate observation and equipped with a few good books has adequately prepared herself for such teaching. If she is a real nature lover, with a genuine interest in her subject, with eyes to see and with ears to hear, she cannot go far astray or fail to take her pupils with her.

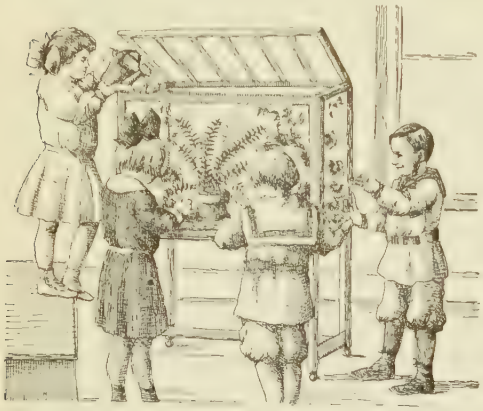
The Teacher's Equipment. The equipment for teaching nature study is not costly. Books are of first importance. There should be in the teacher's library at least a good textbook on botany, zoölogy, physiology, physical geography and mineralogy, and several good general books on the whole subject. Educational journals will be found to contain much valuable material, and the general magazines frequently contain valuable information. A general reference work, comprehensive but written in clear, simple language, should be in every school library. Books of poetry should not be overlooked, for they will do much to give the child visions of beauty which he cannot express for himself. The teacher will probably need for himself such articles as a pair of field glasses, a jacknife, a pair of shears and a botany can; stout clothing that will stand all kinds of outdoor weather might very well be included in such equipment. Perhaps the most important item of all is the notebook, in which all of the outdoor observations should be recorded so they may be verified or accounted for later by means of reference books.

Equipment for Nature Study

One corner of the schoolroom should be furnished with a table where the objects and specimens which the pupils are constantly bringing in may be placed and cared for. Such a table could be put up by a carpenter or made by some of the older boys of the school. If the school board does not provide one, the materials could profitably be donated. In one country school the older boys brought lumber and built such a table, as well as a set of bookshelves, a shelf for the dictionary and a number of other things. These boys had no manual training, but most country boys can use tools.

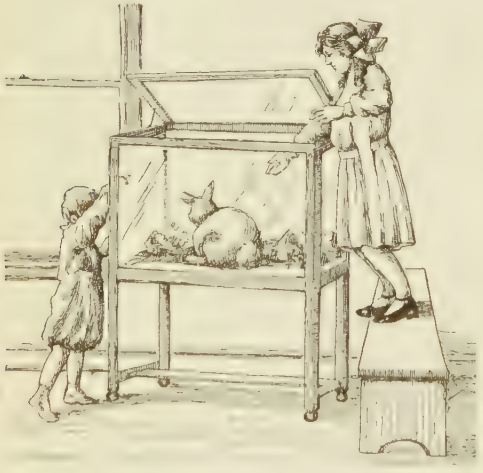
A Terrarium. There ought to be both an aquarium and a terrarium. The latter may be a new word to most boys and girls, so the teacher should explain its derivation. If a regular glassed-in terrarium cannot be obtained any bit of earth will do, though it is not so effective a laboratory if no animal life can be confined within it. The terrarium can be made into a miniature outdoor world. First the bottom of a box should be covered with stones, as many different kinds as the children can collect, and a layer of soil should be placed over most of the surface. This soil can be car-

peted with moss, or it can be sown with grass seed. The children will be interested in bringing in as many different seedling trees as they can find, and these can be changed from time to time. Tiny plants which bear transplanting



A TERRARIUM

can also be set out, to create a realistic scenic effect. Animal inmates of the terrarium will be a never-ending source of delight. Toads, turtles and salamanders, caterpillars, butterflies, potato beetles and other insects are easily procured. If possible, add a shallow pan of water for a pond so that those inmates which need it can have water. The terrarium can be emptied, if it seems desirable, and a hen or a rabbit or a duck may become an inmate for a day or two.



AN ANIMAL CASE

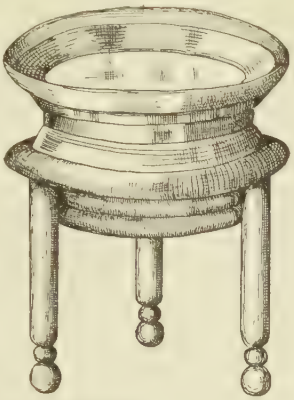
The Aquarium. Like the terrarium, it may be as simple or as elaborate as one desires. (Illustrations appear under the title AQUARIUM.) Any glass container will do for an aquarium, for even a jelly glass is large enough to harbor a whole family of insects. A layer of sand should be placed in the bottom of the jar, perhaps an inch deep. In this sand may be sown such water plants as watercress, stoneworts or water starwort. A layer of stones will then need to be added to hold the plants in place. It must be remembered that plant life is essential to the success of an aquarium, as the plants supply both food and oxygen to the inmates. In filling the jar it will be necessary to tip it and pour the water in very gently so as not to disturb the plants. Water from a tap should never be used; it should always be water from a pond or stream. A dip net can be used to get living creatures for the aquarium. In a large aquarium several varieties of aquatic life can be confined at the same time, but in a small one the animals will survive longer if each is kept in a separate jar. Prepared fish food, a bit of meat, insects or worms can be dropped into the jars for the inmates to feed on, with a string attached so that they can be removed at the end of a day; otherwise the water will become foul.

Insect Cages. Cages for insects may be made by putting an ordinary glass lamp chimney on the top of a flowerpot, and covering the top with a piece of cheesecloth or mosquito netting fastened in place with a rubber band. The aquarium jars may be covered in the same way if water insects, such as water beetles or water boatmen, are to be kept from escaping. A number of these insect cages can be used with profit. Flies may be bred in one; in others, plant lice, ants, ladybird beetles, butterflies or moths may be confined and observed. It is particularly desirable that the children should have a chance to note the life cycles of various insects.

Flowerpots should be furnished in abundance, as well as baskets and boxes, which may be used for gardening in miniature or for carrying specimens. If live animals are to be brought in, such as a kitten, a rabbit, or a chicken, a covered basket with two handles will be needed. There should also be garden tools and plenty of cheesecloth. The latter may be used for a number of purposes, not the least of which should be dusting. The pupils will need to learn to keep their tables and other possessions free of dust.

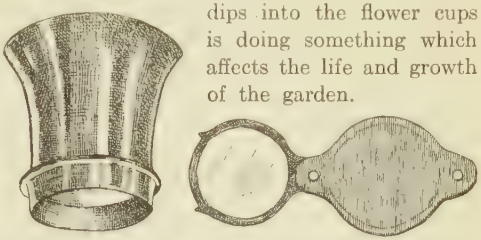
A Lens. If a lens can be procured it will prove a never-ending source of interest to the children. The best lens for young children is one they will not need to handle—one which is

mounted on a tripod so that the object to be inspected may be placed underneath it. There is probably no one who does not take delight in seeing tiny things magnified so that every detail can be inspected in all its perfection. A potato beetle, a snowflake, a bit of moss or the heart of a flower is not only a thing of beauty, but also an intricate and fascinating marvel when seen through a lens.



TRIPOD LENS

The School Garden. Gardening, as such, is not nature study, but a garden can be made the basis for nature study. This is done by giving the children, for instance, the reason for everything they do in connection with the garden. When they are taught how to prepare the soil, teach them the reason for this from the standpoint of the plants' development. Lead them to observe that every plant is an individual, with peculiarities as marked as those of a human being. Teach them to note that each plant has its own form of flower, its own way of developing and planting its seeds. Make them see that every grub and earthworm, working beneath the soil, is doing something for good or ill, either helping the growth of the plants or hindering it. Every insect feeding on leaf or root, every bird that visits it, every bee that dips into the flower cups is doing something which affects the life and growth of the garden.



TWO FORMS OF MICROSCOPES

Aside from furnishing a laboratory for nature study, the school garden serves the purpose of giving the child some active work to do every day. Unfortunately, not all schools have gardens. Any country school and probably any village school could manage some sort of a garden, but unless ground is provided by the school board, it is almost an impossibility in towns, and the teacher and children will have to do the best they can with window boxes and flowerpots. If teacher and pupils work together to make the school garden productive; if the pupils learn from this piece of work how and what to plant, and a few fundamental facts about soils, they will be almost certain to want to have gardens at home. This is, perhaps, the happiest thing that can result.

Suggestions for the Study of Nature

In many kindergartens, particularly if the class is small, all nature study is taught out-of-doors. This is ideal, but unfortunately it cannot be achieved in most schools. But teacher and pupils should go on an outdoor expedition not less frequently than once a week. Froebel has something to say about this:

> At least once a week the teacher should take a walk with each class—not driving them out like a flock of sheep, nor leading them out like a company of soldiers, but going with them as a father with his sons or a brother with his brothers, and acquainting them more fully with whatever the season or nature offers them to see.
>
> Not only children, but indeed many adults, fare with nature and her character as ordinary men

A DAY WITH THE BIRDS

fare with air. They live in it and yet scarcely know it as something distinct, and much less with reference to its essential properties concerning the preservation of life. * * * *

Therefore, these children who spend all their time in the fields and forests see and feel nothing of the beauties of nature and of their influence on the human heart. They are like the people who have grown up in a very beautiful country, and who have no idea of its beauty and its spirit. * * * *

It is important that boys and girls should go into the fields and forests with adults, *together striving* to receive into their hearts and minds the life and spirit of nature.

On the outdoor expeditions it is probably desirable that the teacher, as far as possible, should be an onlooker and let the children discover things for themselves. With very young children no detailed study is possible, but with older children interest may be keener if they go out with the idea of searching for some special insect or animal or plant or bird to study in detail. There is infinite variety in the things one finds to study. Seasonal changes, for instance, mean changes in the whole aspect of the world in which we live. These changes can be studied in all their aspects. The study of all the native wild birds and their habits, the study of wild flowers and weeds, of trees, of grubs and worms and insects, of a multitude of little animals, of the physical formation of the country round about—here is material for a lifetime of observation.

Life and Death. Perhaps no greater danger besets the pathway of the teacher than the question involved in her pupils' attitude towards life and death. It is inevitable that the pupil will acquire a sympathetic interest in the lives of the animals and plants studied, and this is quite likely to check the vandalism which most boys and girls have and which Froebel says originates in the pupil's desire "to obtain an insight into the inner life of the animal, to get at its spirit." He also adds that "failure to explain or to guide, as well as false interpretation or guidance, or the misunderstanding of this desire, may at a later period develop in boys hardened, intentional cruelty to animals." Nature study is the surest way to "explain and to guide" the pupil so that he will want to protect all living creatures—plants and animals alike.

One rule that will have to be made is that one must never kill wantonly or cruelly. Death in itself is not terrible. It is as natural and inevitable as life, and it need not be emphasized any more than the fact that creatures eat or fall asleep. When the pupil begins gardening he will learn that we have among plants both friends and foes, that weeds are foes and that many insects are foes. In studying the life cycle of a cabbage butterfly in one of the insect cages the pupil becomes interested in the living insect. He sees its development from yellow egg to the velvety green caterpillar, from the chrysalis to the white-winged butterfly, and to kill it would be unthinkable. But later, when the child is watering and cultivating his cabbage plants and the butterfly comes along as an enemy, it should seem quite normal to him to spray the cabbages so that the butterfly will die. But, to gain knowledge of the life story of insects or other creatures is nature study; to destroy them as pests is a part of agriculture or horticulture. The one may be of fundamental assistance to the other, but the two are quite separate and should never be confused.

Materials for Study. The whole outdoor world is the material for nature study. The subject matter might be classified in this way: *animal life,* under which will come the study of birds, fish, batrachians or amphibians, reptiles, mammals, and insects; *plant life,* under which will come the study of wild flowers, cultivated plants, flowerless plants, and trees; and another division might be called *earth and sky.* Doubtless this sounds rather formidable. Such a course it might well take a lifetime to cover; but it is really much less formidable than it sounds. The child cannot learn to know all the wild flowers, but he can learn most of those in his immediate neighborhood. Perhaps only a few will be studied in detail, but this study will enable him to observe other plants intelligently for himself, to take the concrete example as a basis of comparison with other examples. In studying birds, a minute study of one species will give him the key to all the other birds he sees.

And it must be borne constantly in mind that these subjects are not to be taught as a science, but merely as an interesting course of observations on living things. There was formerly a tendency to make nature study a study of dead things, but this has been changed. Not stuffed birds, but birds on the wing; not the dead moth impaled on a pin, but the moth hovering around a flame; not the mounted specimen butterfly, but the butterfly dipping into the flower cups; not pictured jungle animals, but animals with which the child is familiar—these should furnish the basis for nature study lessons.

If one unalterable rule were to be made and followed in a nature study course it would be this: study live things. It may be difficult to achieve this at all times, but make it a rule. John Burroughs sounds another warning:

"I am not always in sympathy with nature study as it is taught in the schools. Such study is too cold, too mechanical, it is likely to rub the bloom off nature; it misses the accessories of the open air, it and its exhilaration, the sky, the clouds, the landscape, and the currents of life that pulse everywhere."

And Froebel says:

"In rendering the boy familiar with natural objects we are by no means concerned with the teaching of names or of preconceived views and opinions, but only with presenting the things themselves with their obvious attributes in such a way that the boy may view each object as the definite individual object reveals itself in its form, etc. Even the knowledge of a previously given name is unimportant; only the clear and distinct apprehension and the correct naming of the general and particular attributes are important."

Bird Study. Detailed suggestions for this branch of nature study may be found in the article BIRD, subtitle *Study of Birds*, page 733.

Fish Study. It will be comparatively easy to secure fish from ponds or lakes. Possibly one of the most easily-procured subjects is the goldfish. A detailed study of fish anatomy similar to that made with birds can be begun. The different parts of the fish can be named, perhaps by means of a diagram on the board. Its shape and size, its appearance from above may be noted; its fins, its tail, its scales, its gills, its eyes, etc., are all points of interest and significance. The bullhead, the common sucker, the shiner (minnow) and the sunfish may be taken for study after the subject of the goldfish has been exhausted.

Study of Frogs and Their Relatives (AMPHIBIANS or BATRACHIANS). This division of nature study may begin with the toad. A tadpole aquarium may be started, and the entire life cycle of the toad may be studied. This will intensely interest all children. The pupils will note the toad's protective coloring, which is so like the soil; its legs and feet, its behavior and its habits. If they are allowed to handle a pet toad, which might very well be a permanent inmate of the terrarium, they will learn, too, that the belief that a toad causes warts is only a superstition. Its usefulness in gardens should be emphasized. Next may come the tree frog, then the frog and the salamander.

Reptile Study. Thoreau says in his journal, "I have the same objection to killing a snake that I have to the killing of any other animal, yet the most humane man I know never omits to kill one." Perhaps reptile study, for lack of living specimens, can go no further than the garter snake, but if it teach only that this snake is a common and harmless little creature it will be of value. The study of the one snake will probably cure children of the unreasonable horror of snakes which most people have and which children acquire naturally. After studying the garter snake they might proceed to the study of a turtle. A small turtle may be placed in the aquarium; there should be a stone projecting out of the water for it to climb upon, or a pond might be made for it in the terrarium. The children should learn to know the most common species of turtles—the snapping turtle, the mud turtle, the pond turtle, the wood terrapin, the box turtle and the soft-shelled turtle. See TURTLE.

Mammal Study. This branch of study might begin in the winter with the rabbit, when the children will be able to find its tracks in the snow. Its coat, which changes in color to fit the season, its long ears, which give warning of approaching danger; its long legs, which enable it to run so swiftly, should all be dis-

FRIENDS IN SWAMPY PLACES

cussed. Tame and wild rabbits may be compared. Perhaps there will be a chance to study a muskrat out-of-doors, and also mice and rats. The woodchuck will make an interesting series of lessons, and there is the squirrel, the chipmunk, and the little brown bat. Dogs and cats, goats and sheep, horses and cattle and pigs can be made the subject of endless lessons. In studying the domestic animals their economic value should be emphasized.

Insect Study. Insects are the most interesting, most numerous and the most available of all living creatures for nature study. The children will be fascinated by studying insect eggs under a microscope, for they are of widely differing forms and often of beautiful colors. From close observation of eggs they can follow the insect, just as they did the toad, throughout its life cycle. Caterpillars and moths and butterflies, the codling moth which works such havoc to fruit trees, and other parasites on trees furnish material for valuable study. And then there is the grasshopper, the katydid, the crickets, black and white, and the cockroach; there are dragon flies and ants and mosquitoes and house flies, potato beetles, ladybirds, fireflies and ants; wasps and hornets and bees, and spiders—materials for years of study and so fascinating that one hardly knows where to begin.

Plant Life. All pupils love flowers and enjoy bringing them to school. Flower study may be begun simply by teaching the children to know by name the flowers which they bring in; it will not be long before the names of all the common flowers, both wild and cultivated, will be familiar. Another thing which may be taught very easily is care of flowers. Children should learn that, once they have picked a flower, they must take care of it—never allowing it to wilt because they are too tired or too busy to put it in water. It is impossible to outline here all the infinite ways of teaching flower study, but it is probably the most familiar branch of nature study to the teacher. The list of wild flowers and cultivated and flowerless plants is so long that it cannot be given here. The list of trees is also too long to be given. Lists of flowers and trees for study are given under those headings in these volumes.

In stimulating and encouraging the interest in trees, "leaf prints" of all the trees in the region will be a great help. The materials needed will be a thick plate of glass, large enough to contain the largest leaf on its surface, a tube of printer's ink, two rubber rollers, the sort that photographers use in mounting prints, and paper. To make a print put a few drops of ink on the plate of glass, and spread it with the roller, ink the leaf by putting it on the inky surface of the glass and passing the roller over it. Put the leaf between two sheets of paper and roll once with the clean roller, pressing down on it as hard as possible. Two prints are made at each rolling.

Earth and Sky. For earth and sky study there is a great variety of subjects, from a brook to a snowflake. The soil of the earth and the different minerals—salt and quartz, feldspar, mica and granite—furnish numerous topics for study. The story of the magnet can be made into a series of lessons, as also may the study of the air. Rain and hail and snow, winds, stars and sun and moon—all these can be studied, for does not "earth and sky" include the whole universe? A.C.

Helpful Books. The list of books that will be found helpful in the study of this absorbing subject is a lengthy one. In fact, such books constitute a library in themselves. The following can be recommended to those who desire books of a general character: Lange's *Handbook of Nature Study;* Hodge's *Nature Study and Life;* Gosse's *Romance of Natural History;* Hall's *Open Book of Nature;* and Bigelow's *Spirit of Nature Study.*

To the teacher the following will make an especial appeal: Jackman's *Nature Study for the Grades;* Wilson's *Nature Study in the Elementary Schools;* Munson's *Education through Nature Study;* Comstock's *Handbook of Nature Study for Teachers and Parents;* and McGovern's *Nature Study and Related Literature* and *Type Lessons in Nature Study.*

Then there are numerous books of a special character, wherein are described particular forms of outdoor life. Among the many charming and interesting books of this type are Holland's *Butterfly Book;* Step's *Wayside and Woodland Blossoms and Insect Artisans and Their Work; Marvels of Insect Life,* edited by Step; Hardcastle's *Birds of the World for Young People;* Wright's *Citizen Bird;* and Keeler's *Our Garden Flowers, Our Northern Shrubs and Our Native Trees.* In this connection, too, should be mentioned *The Nature Library* (seventeen volumes), which presents the whole realm of nature in a very readable form.

Related Subjects. No attempt is made here to list all the topics in these volumes which might with profit be referred to in connection with nature study, but it is believed that the ones here given will prove specially helpful, as many of them have been prepared from the "nature study" point of view. Under a number of them indexes are included, and the range of reading indicated is thus a wide one:

Ant	Astronomy
Aquarium	Bee

Beetle
Bird (with list)
Botany
Butterfly
Cat
Dog
Fish (with list)
Flowers (with list)
Fly
Frog
Gardening
Geography
Geology
Insect (with list)
Kindergarten
Language
Mosquito
Physical Geography
Plant (with list)
Rabbit
School Garden
Seeds
Story-Telling
Toad
Tree (with list)
Turtle
Weeds
Zoölogy

NATURE WORSHIP, the adoration of objects and forces in nature has been a part of the religion of many peoples. The mythology of the ancient Greeks and Romans, which was also their religion, has numberless stories in which objects in nature are seen as gods. The Greeks, for instance, said that the sun was a god who drove a chariot of gold across the sky. (For a full discussion of this see the article MYTHOLOGY.) The Persians worshiped fire, the Egyptians considered the serpent a good genius, and in Hindu temples to-day the sacred cobra has its devotees. The ancient Britons, Norsemen and Slavs held the oak tree sacred as the home of a god; our own Maypole dance is the reminder of the old ceremonies they used in their worship.

NAUGATUCK, *naw'ga tuk,* CONN., a town and borough in New Haven County, situated in the southwestern part of the state, five miles south of Waterbury and twenty-seven miles northeast of Bridgeport. It is on the Naugatuck River and is served by the New York, New Haven & Hartford Railroad and electric interurban lines. In 1910 the population was 12,722; in 1920 it was 15,051 (15 per cent gain). The town was incorporated in 1893; it has a Federal building, constructed in 1916 and costing $53,000, the Whittemore Memorial Library, the Whittemore Memorial Bridge and a fine high school, also the gift of J. H. Whittemore. Here are important manufactures of rubber goods, woolen goods, underwear, malleable iron, cut glass, chemical acids, tools and shade rollers. The annual value of manufactured products exceeded $19,990,000 in 1920.

NAUSEA, *naw'she a,* a disagreeable sensation that is best described by the familiar phrase, "sick at the stomach." The word is so strongly associated with *seasickness* that the latter is often used as a synonym for the former, and this seems not illogical when one considers the derivation of *nausea.* It comes from Greek and Latin roots which mean *pertaining to the sea,* and is closely related in origin to both *nautical* and *navigate.* The typical accompaniment of nausea is expulsion of the contents of the stomach (see VOMITING), and the sensation itself is always referred to the stomach, but the ailment is not necessarily due to stomach disorders. Revolting sights, disgusting odors, shock, sudden fright and painful, sudden blows are common exciting causes of nausea; the sensation is produced by the stimulation of certain nerves which have their centers in the medulla oblongata, and are connected with the stomach. Tendency to nausea varies widely for different persons. Some can endure without discomfort the tossing of a ship on the roughest sea, and others are nauseated merely by the gentle motion of a swing or hammock. As a tendency to nausea is sometimes a symptom of disease, anyone who suffers from chronic attacks should consult a physician.

NAUTILUS, *naw'til us,* a genus of deep-sea animals, consisting of four species, the best known of which is the *chambered,* or *pearly,* nautilus. These names refer to the many-chambered shell in which the nautilus dwells,

CHAMBERED NAUTILUS
In illustration at right a portion of the shell has been cut away, disclosing the chambers.

and to the inner lining of the shell, which is mother-of-pearl, or nacre. Millions of years ago, when the earth was in the early stages of geologic history, and the race of man had not yet appeared, the sea contained hundreds of species of nautilus, the fossils of which show marked resemblances to the existing species. The chambered nautilus lives upon the sea floor in the South Pacific and Indian oceans, notably in the vicinity of the Philippines and the island of New Guinea. The shell of the young animal looks like a small horn, but as the animal develops, its little home assumes the form of a spiral, and each stage of its growth is indicated by a chamber closed at the rear. That is, the nautilus moves forward as it grows, fashioning a partition behind it when it enters a new chamber; thus in the outermost compartment will be found the living animal. The closed chambers are supposed to be filled with a nitro-

genous gas or air. The interesting process of building the shell is charmingly described by Holmes in his poem *The Chambered Nautilus:*

Year after year beheld the silent toil
That spread his lustrous coil;
Still, as the spiral grew,
He left the past year's dwelling for the new,
Stole with soft step its shining archway through,
Built up its idle door,
Stretched in his last-found home and knew the old no more.

Extending through the series of chambers, and connecting them with the body of the animal, is a coiled, fleshy tube, enclosed in a limy covering. This tube is called the *siphuncle.*

Though the nautilus is related to the octopus, it is not provided with the characteristic eight arms bearing suckers. Instead, there are about forty-five pairs of tentacles around its mouth, the pair on the inner side being joined to form a sort of hood that closes the opening into the shell when the animal draws back into the living chamber. These tentacles do not bear suckers, but their inner edges seem to possess the power of grasping objects by flattening against them. It is supposed that by them the nautilus obtains its food—small crabs and mollusks. The animal has a short, thick body, a large head, eyes and ears, four gills and a heart. On the underside of its body is a siphon, or funnel, its organ of locomotion. Through this tube it sends a jet of water with enough force to push it backward. According to some authorities, when it swims forward the tentacles branch out in all directions from the head. Some of the South Pacific islanders trap the nautilus and use it as food.

The nautilus belongs to the class cephalopoda, to which also belong the octopus and squid. In his famous poem Holmes confused the chambered nautilus and the argonaut, an entirely different cephalopod.

Related Subjects. The reader is referred to the following articles in these volumes:

Argonaut
Cephalopoda
Mother-of-Pearl
Octopus
Squid

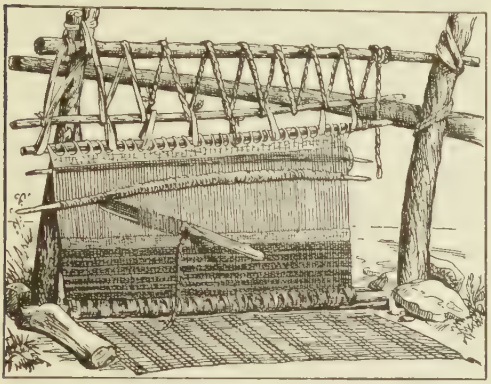
NAVAHO, or **NAVAJO,** *nahv'a ho,* a tribe of North American Indians, belonging to the Athapascan stock, who are known especially as the makers of the beautiful blankets that bear their name. Unlike the great body of Indians living in the United States and Canada, they are growing more numerous, their present number being estimated at 22,455. Less than half live within the boundaries of their great reservation of over 9,500,000 acres—a barren tract of rocks and sand in southwestern Utah, northeastern Arizona and northwestern New Mexico. The others roam the pasture lands outside or are at work in neighboring white settlements. The men and women are alike industrious and live in peace and contentment, doing a little farming, making pottery, baskets, silver ornaments and blankets, but supporting themselves chiefly by their herds of sheep, goats, cattle and horses. They are a wandering people, each family changing its place of abode as the pasturage and water supply give out. At the same time they build rather substantial homes at their regular halting places—round huts made of earth-covered logs, with a hole at the top for the smoke to come out. They care little for the refinements of civilization, and have never accepted Christianity, but hold to their old-time ceremonies and mythology. Like most of the other members of the widely-scattered Athapascan family they call themselves *Dîne,* meaning *people.*

DRESS OF THE NAVAHO

The Navahos were a source of trouble during the greater part of the period of Spanish occupation in what is now Southwestern United States, and for thirty years after the fall of Spanish power, between 1815 and 1845, they carried on the thriving business of stealing horses, cattle and sheep from the Mexicans. From the Pueblo Indians they learned the art of weaving, and from the Mexicans that of working in silver. Their first treaty with the American government was made in 1846, but there was more or less friction with them until 1868, and in 1863 it was necessary to send Kit Carson against them. In 1868 they settled down peaceably on the reservation allotted them, which was enlarged to its present dimensions in 1884.

Navaho Blankets are woven from the wool of the sheep herded by these Indians. The wool

is washed, combed with coarse metal brushes, then worked into yarn on a spindle. The looms for weaving are similar to those used by other primitive peoples. Between two poles, set in the ground a short distance apart, are fastened



NAVAHO LOOM

Upon such crude devices the famous Navaho blankets are made.

two horizontal beams. Between these the warp is stretched. For a shuttle they use a blunt stick, and the weaving is begun at the bottom, the cloth being rolled on a long pole as the work progresses. Dark blue, yellow, red, black and white are the favorite colors, white and black wool being mixed to produce the much-used gray. The women become very skilful at weaving in certain designs. No two blankets are alike, for they do not work from any pattern or drawing, but plan as they weave. The Navahos are shrewd traders and do not exchange their blankets and silver ornaments for beads and tobacco. Their blankets bring good prices, the finest grade selling for $100 and more. The prices of the less expensive range as low as $10. C.H.H.

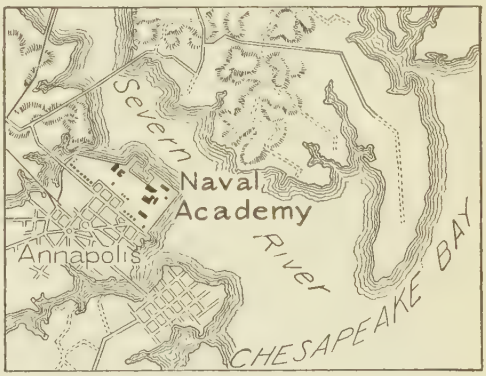
Consult Matthews' *Navaho Legends.*

NAVAL ACADEMY, UNITED STATES, the most important naval school in America and one of the best equipped institutions of its kind in the world. It was authorized in 1845 by the United States government and established at Annapolis, Md., for the purpose of giving instruction to young men to fit them for positions as officers in the navy. The students of the Naval Academy are called midshipmen. Previous to 1902 they had been called naval cadets, but in that year the old term midshipman was revived.

Five nominations for midshipmen are allowed each Senator and Representative in Congress, five for the District of Columbia, fifteen each year for the United States at large, and twenty-five are admitted each year from the personnel of enlisted men in the navy. The nominations for the District of Columbia and the states at large are made by the President. New nominations are made only as vacancies occur by graduation, resignation or death; each vacancy is filled from the district to which the former midshipman was accredited, so membership in the school may be equitably distributed over the country. Five nominations are allowed for Porto Rico, the nominees being natives and recommended by the governor of the island.

Entrance Requirements and Studies. The fact of nomination does not admit a young man to the academy; he must pass entrance examinations of high school grade and must be physically sound and of robust constitution. The course at the academy extends over a period of four years, when the graduates assume the work of ensign in the United States navy. The course of education and naval training is thorough, the discipline of the academy severe. Each midshipman receives from the government $750 per year during his course. Candidates for appointment must be between sixteen and twenty years of age. Candidates must be unmarried; if married during their course of study they are dismissed from the service.

The educational requirements for officers of the United States navy are so high that a candidate to be successful must have the groundwork of a broad education, for in four years



LOCATION OF THE NAVAL ACADEMY

of study he has to acquire knowledge sufficient to enable him to pass searching examinations before he can enter upon a naval career. A graduate of the Naval Academy must be a seaman, an engineer, a marine engineer, navigator,

surveyor, and well acquainted with steam, electricity, and ordnance. He must also have a good knowledge of his own language and know some Spanish and French. The course is comprehensive and progressive. International law is an important branch of study; and when finally graduated an ensign from Annapolis is mentally and physically equipped to fill any position he is called upon to occupy.

From the first of June until the first of September the midshipmen are embarked on practice ships, a battleship temporarily detached from the fleet generally taking a certain number, while others go to a training ship.

The administration of the Naval Academy is vested in a superintendent, who is a naval officer of high rank, appointed by the President. As the equipment was found inadequate to meet requirements, an appropriation of $8,000,000 for improvements was sanctioned by Congress in 1905, as a result of which old buildings were remodeled and new ones erected.

Nearly every naval leader of the War of Secession was from his youth attached to a naval vessel and in that environment his education was secured; such men were David Farragut and the two Porters. The men in the navy who achieved fame in the Spanish-American War, however, were graduates of the Naval Academy, almost without exception. Among these were Admiral Dewey and Rear-Admiral Sampson, Schley and Evans. F.ST.A.

Consult Benjamin's *The United States Naval Academy.*

NAVAL MILITIA, *mi lish'a.* See NAVAL RESERVE.

NAVAL OBSERVATORY, a United States government institution which is a division under the bureau of equipment in the Navy Department. It is situated at Washington, D. C., and consists of not only an observatory with the usual telescope, but a large scientific library and numerous astronomical, meteorological and photographic instruments. It was established as a government institution in 1838 to observe the positions of the various planets and stars, for computing time on United States ships, to correct daily the local time, to test naval instruments for computing location at sea and to spread astronomical information among the American people.

Though it was not officially recognized until 1838, it really originated in a depot for charts established by a naval lieutenant in 1830. In 1833 another lieutenant built at his own expense an observatory to be connected with the chart depot, but in 1838 the Navy Department began to make annual contributions for the maintenance of such work. Four years later Congress authorized the erection of a special building at Washington for the observatory, and when this was finished the institution immediately began to take a leading position in the scientific world. In 1846 the *Astronomical Observations* was published, the first American book of this character.

In 1893 new buildings were erected at Georgetown, near Washington, and there some of the finest astronomical instruments in existence are to be found. One of these is the great telescope with a twenty-six inch lens, which at the time of its completion in 1874 was the largest in the world. With this instrument Professor Asaph Hall discovered the satellites of Mars in 1877, and with other instruments in the building important observations of Neptune and discoveries of various planetoids, meteors and distant stars have been made. Since 1912 the observers have been working in harmony with European observers in matters useful to all nations. The library of about 30,000 volumes is the most valuable collection of astronomical books in America.

NAVAL RESERVE, a reserve naval force that may be called into active service in time of war or during the existence of an emergency. Every country having a navy maintains a naval reserve formed of officers and seamen whose terms of enrolment in the navy have expired, or who have been honorably discharged.

The naval reserve of the United States was established by act of Congress in 1915. All citizens of the United States who have served in the navy for four years or more and have left the service under honorable conditions are eligible for enrolment. The term of enrolment is four years, and application must be made within eight years from final discharge. Those enroling within four months of discharge are placed in Class One, and all others in Class Two. Members of Class One are required to keep on hand such uniform as may be prescribed by the Secretary of the Navy, and all members of the naval reserve are provided with a badge to be worn when the uniform is not required.

Naval Militia. The naval militia constitutes a supplement to the naval reserve. It is organized and managed by the state governments, under the direction of the Department of the Navy. The term of enlistment is three years, and in 1917 the District of Columbia and

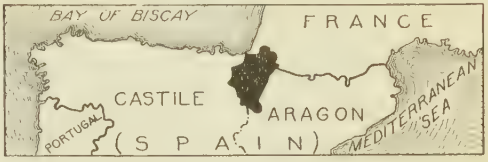
twenty-two states had naval militia corps. The members are not required to serve on ships, but opportunity for a certain amount of training on board ship is usually provided, each state maintaining a corps, usually being granted the use of one or more warships for this purpose. The Secretary of the Navy is also authorized to establish schools or camps of instruction for the naval militia, but during times of peace these camps cannot continue longer than six weeks in a year. In 1921 the naval militia included 600 officers and 7,700 men, and the law creating the naval reserve authorized the President in time of war to increase this number to 17,400. See MARINE CORPS.

NAVAL SCHOOLS OF INSTRUCTION are maintained by all the leading nations of the world for the purpose of special and technical training of officers and men for service in the navy. In the United States the Naval Academy (which see) at Annapolis, Md., is the leading institution of its kind and one of the best appointed in the world; in that school the postgraduate courses only are viewed as a naval school of instruction, the undergraduates being simply ranked as students not yet in the service. At the Naval War College at Newport, R. I., officers are instructed and plans for operations prepared. Goat Island, in the harbor of Newport, R. I., is the home of the Naval Torpedo School and there are other naval schools at Port Royal, S. C., Lake Bluff, Ill., and San Francisco, Cal. Camps or temporary schools of instruction may be established by the Secretary of the Navy at such points as he considers most convenient for instruction of the naval reserve.

The leading naval schools of Great Britain are at Dartmouth, occupying the old battleships *Britannia* and *Hindustan,* with large shore premises and the Royal Naval College at Greenwich, on the Thames. At Kiel, at the mouth of the Kaiser Wilhelm Canal (Kiel Canal), the German government maintains a finely-equipped training school. France has a similar institution at Brest. The object of these schools is the same in each country—to increase the efficiency of naval forces—but methods of instruction differ in many details.

There has within recent years been a strong and growing inclination on the part of Canada to build ships and organize places of instruction for Canadians wishing to serve in a "Canadian navy for Canada." The British Empire now provides naval protection for the Dominion.

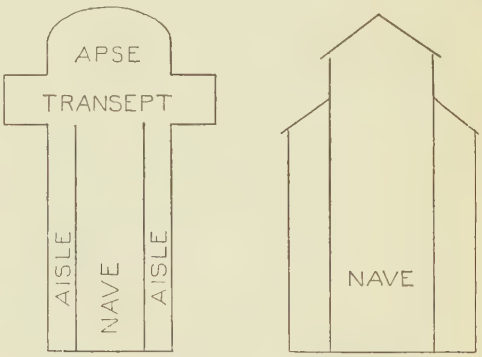
NAVARRE, *na vahr',* formerly an independent kingdom, which included a little of Southern France, but now a province of Spain, whose northern point touches the Pyrenees Mountains where they meet the Bay of Biscay. Its



LOCATION OF NAVARRE

area is about 4,055 square miles. The lower ground is extremely fertile and produces wheat in abundance. The fruit of Navarre is famous; from its apples cider is made, and its grapes are in great demand in Southern France to improve the flavor of French wines. Flax, oil and hemp are exported, and mulberry trees are extensively cultivated, principally for their leaves for feeding silkworms. The mountain slopes are covered with forests containing pine, beech, oak and chestnut. The streams abound with trout and other fish and large and small game is plentiful. Raising live stock forms an important industry, Navarre in this respect being the richest of all Spanish provinces. Navarre has been important in history.

NAVE. The floor plan of the earliest cathedrals was, in general, the shape of a Latin cross. The space corresponding to the arms of the cross, is called the *transept.* That part above the arms is known as the *apse* and con-



FLOOR PLAN OF A CATHEDRAL

tains the choir stalls and altar. The long main body of the building is called the *nave.* Usually on either side of the nave are *aisles,* separated from it by columns. The nave is the highest part of the building and is lighted by windows in the walls above the roof of the aisles. See CATHEDRAL.

NAVIGATION, *nav i ga' shun,* the science of determining the position of a ship at sea, and so directing its course from place to place. Considering the many centuries man has ventured upon the sea, scientific navigation is relatively modern. Such early seafaring men as the Phoenicians, the Carthaginians and the Greeks felt their way from point to point along the coast and rarely ventured out of sight of land. The Vikings were hardly bolder, and the discoverers of Iceland were probably the crew of a ship blown out of its course in a squall. Towards the close of the Middle Ages, however, navigation made great strides. It was the feat of a brave navigator of the period—the discovery of America by Columbus—that chronologists adopted as the starting point for the modern era. With the discovery of an instrument for determining longitude, and later, with the invention of a device for taking the height of the sun and stars, greater accuracy in holding a course was made possible. Trigonometry and logarithms began to be used in calculations by the beginning of the seventeenth century.

The course of the ship is determined by the use of the compass (which see). The log, usually heaved once an hour, registers the rate of progress (see Log). The position of the ship may be determined by noting the distance covered in a given direction. This method, however, is less satisfactory than that of taking frequent observations of the sun or the stars and determining the position by reference to data furnished by the *Nautical Almanac,* which gives the position of the chief heavenly bodies for fixed times at Greenwich. An accurate and detailed chart is, of course, indispensable. In addition to the compass and the log, the chief instruments required are the chronometer and the sextant. See Ocean, subtitle *Ocean Routes.*

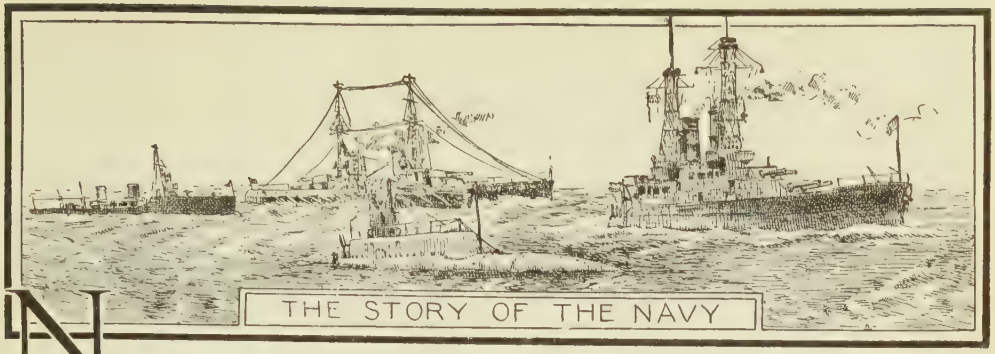
Freedom of Navigation. During the period of discovery, in the fifteenth and sixteenth centuries, it was not only the new lands that were claimed by the discoverers, but newly-found portions of the sea, as well. There was a "Spanish main," for instance, and Spain demanded the right to control navigation in that part of the ocean. During the nineteenth century, however, the principle became well established that the high seas could not be claimed by any one country, and that all nations had a right to unrestricted navigation of them. Only in the case of straits leading to inland seas or of narrow, shut-in arms of the ocean has there been much unfriendly controversy in recent years. See War of the Nations.

NAVIGATION ACTS, the name given to a number of laws passed by the Parliament of England in 1645 and in later years for the protection of British commerce. The first Navigation Act, passed in 1645, decreed that all importations from any country in the world should be shipped into England only in vessels built in England or in her colonies or in those manned by English masters and mariners. The second Navigation Act, passed in 1663, levied excessive taxes on goods brought into British colonies from all foreign countries. Later, duties were levied on goods shipped between colonies, if the same products could be obtained in England. In 1719 Parliament condemned all colonial manufactures as "tending to independence."

Before 1761 twenty-nine acts had been passed in restraint of colonial trade, including one law which prohibited molasses and sugar importation. America suffered little from these laws, owing to the custom of smuggling, which the colonists looked upon as a legitimate business. Several provisions of the acts were favorable to American industry, especially shipbuilding, and certain privileges were enjoyed by colonial manufacturers which were debarred to all others. However, the restriction and suppression of trade and manufacture was vigorously censured by the Americans, and was one of the principal causes of the Revolutionary War.

NAVIGATION LAWS, laws intended to regulate the shipping of any country. Early navigation laws were drawn expressly to deprive foreign ships of the right to engage in the carrying trade. The American colonies, for example, were restricted to English markets and were obliged to ship their goods in English vessels, except where they had their own vessels. Navigation laws, adopted by most of the maritime powers and retained until about the middle of the nineteenth century, forbade or restricted the registration of vessels foreign built or foreign owned; required the major part of the officers and crew to be of the country of registration, and otherwise hampered free shipping.

These hard conditions have been much modified of late. In America it came to be seen that rigid navigation laws, which prevented the registration of foreign-built ships, were arresting the growth of a merchant marine. The War of the Nations, which in 1914 swept so large a part of the foreign carriers from the sea, resulted in the passage of liberal laws with regard to the registration of foreign-built ships; however, few such vessels were added to American registry. See Merchant Marine.



NAVY, *na'vi.* In the days of Queen Elizabeth Sir Walter Raleigh said:

> Whosoever commands the sea commands the trade, and whosoever commands the trade of the world commands the riches of the world and, consequently, the world itself.

The importance of a navy to a nation having an extensive seacoast and the great advantage of being able to control navigation upon the high seas have been forcefully illustrated in the War of the Nations, and it is well at the outset to know of just what a navy consists. We usually think of it in terms of 30,000-ton battleships, but it includes far more. In the words of one of our best authorities, "The sea power of a nation may be said to include all its means for contesting the control of the sea. It includes the battle fleets and their auxiliaries, cruisers, destroyers, submarines, aircraft, also naval bases and stations, fortified and naturally protected harbors, coast defenses, the merchant marine (embracing armed and unarmed vessels engaged in commerce and passenger traffic)—in short everything the country possesses that may be useful, directly or indirectly, for naval warfare." We notice that this is a statement of what *sea power* includes, and so much of it as pertains to ships and their equipment and supplies and men to operate them constitutes in its broadest sense the navy of a nation. In its narrowest sense, the one in which the term is generally used, the navy includes the warships and their auxiliary ships, with the necessary personnel of officers and men.

What a Navy Does. In every war between nations having navies there are sea fights, but usually their number is small compared to the number of engagements between the armies. Nevertheless, the work of the navy may be far more influential in bringing a war to a close than all the engagements of the hostile armies together. Of course, when nations separated by the sea engage in war, the navy constitutes the first line of defense for each belligerent, and it becomes the first line of offense when an invasion is attempted.

The second duty of the navy in war is to blockade the ports of the enemy so as to prevent it from trading with other nations (see BLOCKADE). In the War of the Nations the navies of the allies practically gave them control of the Atlantic, and they were able to blockade the ports of the central (Germanic) powers to such an extent as to prevent these powers from securing much-needed supplies. In the War of Secession (which see) the blockade maintained by the Federal government was effective in bringing the conflict to a close because it prevented trade between the Confederate states and foreign nations. In time of war it is the duty of the navy to protect such means of communication as submarine cables, and wireless stations located on islands and along the coasts and under the jurisdiction of its own government. It is also its duty to destroy or damage these means of communication belonging to the enemy. Valuable service is therefore often performed by single ships or by small squadrons of three or four ships in patrolling the waters near these stations and near the landing places of submarine cables.

In times of peace continuous training is given the personnel to increase the efficiency of both officers and men. Old ships are repaired and usually a number of new ones are built each year. The equipment also is constantly being improved and new inventions are adopted whenever their addition will make the work of the navy more effective. Powers having colonial possessions make use of their navies for transporting officers and men in the colonial service, for protecting the colonies against aggressions of unfriendly powers and for quelling insurrections.

The Modern Navy. The navies of the Great Powers are the result of centuries of study and experience. They contain the most perfect instruments of warfare and the most highly trained bodies of men of any organizations in the world. The greatest development has occurred since the War of Secession, and the first step in this development was the introduction of the iron-clad warship, the first battle between vessels of this type being fought in Hampton Roads, Va., March 9, 1862 (see MONITOR AND MERRIMAC). After this battle all naval powers began to construct armored warships, and the progress since the adoption of this type of vessel has consisted chiefly in making larger and stronger ships and in perfecting the ordnance which constitutes their armament. This includes increasing the size of the guns and the perfecting of the machinery for operating them. The most powerful battleships of the dreadnaught type now carry 16-inch guns that will throw a shell weighing nearly a ton sixteen miles. The following comparison affords a good illustration of the progress in naval construction and equipment. One of the most noted naval battles in American history was the Battle of Lake Erie in the War of 1812, in which Commodore O. H. Perry destroyed the British fleet under Commodore Barclay. "The combined broadsides," says a naval authority, "of all Perry's fleet on Lake Erie scarcely weighed as much as a single shell from one of our big turret guns."

Battleship. For a full description of battleships the reader is referred to the article WARSHIP. This article deals with battleships only so far as is necessary to an understanding of the different classes of ships that constitute a modern navy. The big-gun ships upon which the navy chiefly relies in battle are of two classes—battleships of the first class or *dreadnaughts* and *dreadnaught battle cruisers* or *pre-dreadnaughts*. The pre-dreadnaughts differ from the dreadnaughts chiefly in their armament. Instead of carrying all big guns and torpedo defense guns, they carry some big guns and some smaller guns. Next to the pre-dreadnaughts come the *armored cruisers*, which are faster and carry less armor and smaller guns. The *light cruiser* is a fast ship; it is used for scouting purposes, and in war, for destroying commerce. Following the classes described come torpedo boats, destroyers, transports, colliers, hospital ships and supply ships, the ships of each class having their special work, and all classes being necessary to a completely developed navy.

Personnel. The strength of a navy is usually rated according to its number of ships of different classes and the number and size of its guns. But such estimates are often at fault, because they do not take into consideration "the man behind the gun." As we have already remarked, the men of the navy are the most highly trained body of men in their country's service, but the training in some navies is much better than that in others, and ships with an inferior armament often disable or destroy ships of a heavier armament, because the inferior guns are operated by better marksmen. A good illustration of this fact is seen in the destruction of the Spanish fleet off Santiago, Cuba, in the Spanish-American War. The marksmanship of the Spanish gunners was so poor that practically no damage was done to the American ships, while nearly every shot from the American ships was effective. The best of armaments in the hands of unskilled men is practically useless. For this reason each naval power tries to raise the men of its navy to the highest degree of efficiency. See NAVAL SCHOOLS OF INSTRUCTION, page 4093.

Navy of the United States

Early History. The navy of the United States came into existence in 1775, at the beginning of the Revolutionary War, and consisted of a few small vessels armed and manned by New England seamen. Its first service consisted in blockading the port of Boston and capturing a number of British ships. A naval commission was appointed by Congress the same year, and the government immediately began the construction of ships of war. At the close of the Revolution, the American navy consisted of sixty-four vessels carrying 1,242 guns, besides nearly 800 privateers. The ships built by the colonies were the equal of any warships of the time. After the Revolution the navy was allowed to decline, but interest in it was revived in 1794, and the construction of several men-of-war was ordered. Among these was the *Constitution* which became one of the most famous of American ships (see CONSTITUTION, THE).

In the commerce war with France and the war with the Barbary pirates, the navy won the favorable recognition of European nations and gained for the new republic considerable distinction. Nevertheless Congress again returned

WORLD BOOK

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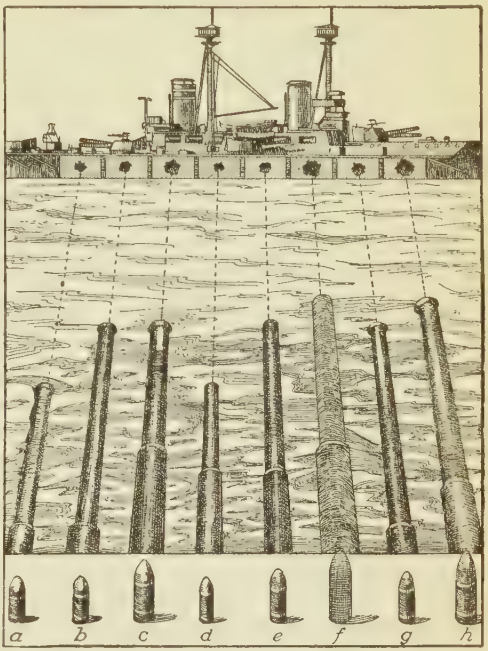
THE "ARIZONA." America's greatest battleship. It has a displacement of 32,000 tons, is 600 feet long, and carries twelve 14-inch and twenty-two 5-inch guns. Its crew can hit a target no larger than itself five times out of twelve at eleven miles.

to its policy of neglect and at the close of Jefferson's administration the country was practically defenseless against a sea power. The approaching trouble with Great Britain caused renewed interest in providing the country with sea power, and during the War of 1812 the navy won world-wide distinction, owing chiefly to the superior skill of the gunners.

The War of Secession. Between 1815 and 1860 steam power replaced sails on all the important warships and the screw propeller finally replaced the paddle wheel. There was also improvement in ordnance and other equipment. At the beginning of the War of Secession the navy comprised ninety vessels, only forty-two of which were of service. The personnel consisted of 1,457 officers and 7,600 men. At the close of the war it included 7,500 officers and 51,500 men; 208 additional vessels were constructed and 418 were purchased. The development during this war which revolutionized naval construction was that of the ironclad ship of the Monitor type. The invention of the Dahlgren gun was likewise a great step in advance in armament. During the war the navy maintained an efficient blockade along 3,000 miles of coast, and captured or destroyed over 1,500 Confederate and British vessels.

The Navy of To-Day. The resources of the country were so nearly exhausted by the War of Secession that for a number of years the navy was neglected, and in 1881 it had only thirteen vessels of the first rating and these were constructed of wood. It had four ironclad ships of the third rate and a few Monitors, so that from a naval point of view the country was defenseless. This year the Secretary of the Navy secured an appropriation for the construction of a number of armored battleships, and since that date the plan to add two or more battleships each year, with the required number of auxiliary ships, has been practically followed, though the appropriations made by each Congress have varied in amount. In the Spanish-American War the navy rendered such efficient service as to win the commendation of all nations, and since the close of that conflict it has been greatly strengthened by the addition of seventeen ships of the dreadnaught type. Two of these—the *Pennsylvania* and the *Arizona*—at the time of their completion were the most powerful battleships in the world. In addition to the dreadnaughts there were, January 1, 1919, thirty-one pre-dreadnaughts which experts claim were superior to any ships of the same class in the navies of Europe. The dreadnaughts and pre-dreadnaughts are named after the states.

In August, 1916, Congress made an appropriation of nearly $453,500,000 for the construction of 156 naval vessels and one coast defense submarine, all to be undertaken before July 1, 1919.



NAVAL GUNS

Since 1914 information regarding navy building has been a matter requiring secrecy in every European country. In August, 1914, the following facts regarding the range and destructiveness of guns were known:

(*a*) 12-inch English, wire-wound gun; projectile weighs 850 lbs.; 47,000 foot-tons energy at muzzle; penetrates 11½ inches Krupp steel at 3,000 yards (nearly two miles).

(*b*) 12-inch English, wire-wound gun; projectile weighs 850 lbs.; 52,000 foot-tons energy at muzzle; penetrates 9 inches Krupp steel at 10,000 yards (about six miles).

(*c*) 13.5-inch English, wire-wound gun; projectile weighs 1,250 lbs.; 57,000 foot-tons energy at muzzle; penetrates 11 inches Krupp steel at 3,000 yards (nearly two miles).

(*d*) 11-inch German, Krupp gun; projectile weighs 760 lbs.; 42,500 foot-tons energy at muzzle; penetrates 11 inches at 9,000 yards (about six miles).

(*e*) 12-inch German, Krupp gun; projectile weighs 980 lbs.; 55,000 foot-tons energy at muzzle; very little is known about this weapon.

(*f*) 14-inch German gun; projectile weighs over 2,200 lbs.; muzzle energy and penetration unknown.

(*g*) 12-inch United States gun; projectile weighs 850 lbs.; 52,000 foot-tons energy at muzzle; penetrates 11 inches at 9,000 yards (about five miles).

(*h*) 14-inch United States gun; projectile weighs 1,400 lbs.; 65,600 foot-tons energy at muzzle.

Since that date the great war with Germany led to the construction of several hundred *submarine chasers*, a new type of ship which the development of the submarine has made neces-

sary. In 1921, at the limitation of arms conference, the powers agreed to a naval holiday for fifteen years, with no new construction; a covenant was signed to destroy a portion of their fleets until the naval strength of the United States, Great Britain and Japan should be in the ratio of 5-5-3.

Naval Guns. The illustration shows the different sizes of guns in use in modern navies, together with their respective projectiles. The size of guns for battleships increases in proportion to the size of the ship, and now guns sixteen inches in diameter are employed on the largest dreadnaughts. All large guns are mounted on carriages which are operated by electric or hydraulic power. They are breech-loading and are fired by electric percussion. These guns and all mechanism connected with them have been brought to such a degree of perfection that they are fired with incredible rapidity. A 16-inch gun can fire two shots a minute; a 15-inch, two and one-half per minute, and a 14-inch, three shots per minute. Smaller guns are fired still more rapidly. For a description of large guns, see ARTILLERY.

Navy Yards. Navy yards for the construction and repair of vessels are maintained at New York (Brooklyn); Boston; Portsmouth, N. H.; Norfolk, Va.; Philadelphia; Mare Island near San Francisco; Washington, D. C.; Bremerton, Wash.; Charleston, S. C., and New Orleans. There are naval stations at Key West, Fla., and in our outlying possessions at Samoa, Guam, the Philippines, Honolulu and Guantánamo, Cuba. These stations serve as naval bases for supplies and making minor repairs.

Organization. Under the Constitution the President is commander-in-chief of the navy, but the administration of its affairs are in the hands of the Secretary of the Navy, who is at the head of the department of the navy. The office of Chief of Naval Operations was created in 1915, and is filled by appointment by the President with the concurrence of the Senate, from the officers of the navy not below the rank of captain. This officer, under the direction of the Secretary of the Navy, has charge of the operations of the fleet and with the preparation of plans for its use in war. (See NAVY, DEPARTMENT OF THE, page 4099.)

Other Powers

At the conclusion of the War of the Nations Germany ceased to be a sea power, falling from its high position of second in strength in the world, for it was forced to surrender its naval equipment, almost entirely, to the allied powers. The same fate was meted out to the navy of Austria-Hungary; the partition of that country left each of the new countries small, weak and entirely inland, with no access to the sea. The other nations engaged in ambitious naval building programs, apparently in a frenzy of fear that rival powers might so far surpass them in strength as to endanger their safety. In 1925, or thereabouts, it was believed that Britain's strength would be 995 vessels of all kinds; United States', 608; Japan's, 177; France's, 253; Italy's, 245.

However, the call for a conference in Washington in 1921 on limitation of armaments resulted in a radically changed policy, as outlined on this page.

COMPARATIVE STRENGTH OF THE NAVIES OF THE WORLD BEFORE THE WAR OF THE NATIONS

POWERS	Battleships Dreadnaughts	Battleships Pre-dreadnaughts	Coast defense vessels	Battle cruisers	Armored cruisers	Cruisers	Destroyers	Torpedo boats	Submarines	Personnel, officers and men
Great Britain	36	40	..	10	34	91	188	49	97	151,000
Germany	20	20	2	8	9	46	154	...	?	79,000
United States	17	25	4	..	10	15	74	6	75	58,000
France	12	18	1	..	20	9	87	135	86	64,000
Japan	6	13	2	4	13	13	52	27	15	55,700
Russia	8	7	2	4	6	17	135	14	49	52,500
Italy	10	8	..	..	9	8	51	70	27	40,000
Austria-Hungary	8	6	6	..	2	10	18	63	12	19,500

Related Subjects. The following articles in these volumes are closely related to the above:

Admiral
Admiralty
Army
Blockade
Commodore
Gunboat
Marine Corps
Naval Academy, United States
Naval Observatory
Naval Reserve
Naval Schools of Instruction
Privateer
Rank in Army and Navy
Submarine
Submarine Mine
Torpedo
Torpedo Boat
War of the Nations
Warship

NAVY, DEPARTMENT OF THE, the executive department of the United States government which has complete charge of the navy. Naval affairs were under the control of the Secretary of War until 1798, when a separate department was organized. At its head is a member of the Cabinet, called the Secretary of the Navy, who is appointed by, and holds office at the pleasure of, the President. George Bancroft and Gideon Wells are the most distinguished of the men who have held this office. To help the Secretary in his task of general supervision there is one assistant secretary, whose most important duties cover such subjects as naval stations in the island possessions, the marine corps, and the building of ships in navy yards.

The work of the department is further divided among a number of bureaus and special officers. The heads of the bureaus are appointed by the President nominally for four years, and during their term of office rank as rear-admirals, although they may not actually have reached that grade. The names of the bureaus explain the subjects over which they have control—yards and docks, equipment, navigation, ordnance, construction and repair, steam engineering, medicine and surgery, and supplies and accounts. Most of the bureau heads are called *chiefs,* but the surgeon-general is in charge of the bureau of medicine and surgery, and the paymaster-general, of the bureau of supplies and accounts. The office of the judge-advocate general is independent of the bureaus, and its head has charge of courts-martial, special inquiries and legal matters generally relating to the department. The chief of navigation, among other duties, has charge of the Naval Academy at Annapolis and the war college at Newport; and the chief of equipments has nominal supervision of the naval observatory and the hydrography bureau, which prepares charts and maps. These numerous officials in practice constitute an advisory board for the Secretary of the Navy, but he occasionally disregards their suggestions. W.F.Z.

For the organization of the navy itself, see NAVY. For the relative importance of a United States Cabinet officer, see CABINET.

NAZ'ARETH, a town in ancient Galilee, where Jesus spent his early youth. It was a small town, because of the limited water supply; there was but one spring in the entire village. There is no mention of Nazareth in the Old Testament, which proves that the town was little known, and Nathanael expressed the general contempt and depreciation of the time when he asked, "Can there any good thing come out of Nazareth?" (*John* I, 46).

For some centuries after Christ, Nazareth continued to be obscure, but about A.D. 600 it became a place of pilgrimage. The present town, called En Nasira, has a population of approximately 11,000—far in excess of that of Biblical times—and contains the Latin church of the Annunciation, on the supposed site of Mary's house.

NAZARITE, *naz'a rite,* the name given in Biblical times, and in the first few centuries after Christ, to men or women who consecrated themselves to God. The Nazarite might set his own term of consecration, during which he was not to drink wine, shave or touch a dead thing. At the expiration of his vow, the Nazarite made sacrifices, shaved, burned his hair, and might again drink wine. Beside these temporary Nazarites, there were Nazarites for life. John the Baptist was made a Nazarite at his birth, and Samuel and Samson, in the Old Testament, were lifelong Nazarites. The word is derived from the Hebrew verb *nazir,* meaning *to consecrate.*

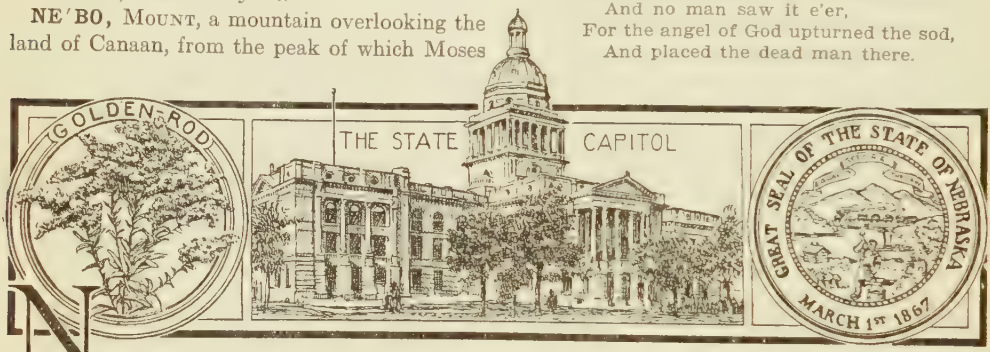
NAZIMOVA, *na ze'mo va,* ALLA (1879-), a Russian emotional actress who has achieved her great triumphs in Ibsen's plays. She was born at Yalta in the Crimea. When twelve years of age she entered the Conservatory at Saint Petersburg (now Petrograd), to study the violin, but later chose a dramatic career. She made her début in London in 1905 in a Russian play, *The Chosen People,* which first brought her talents before the English-speaking world. Although the language was practically unknown to her, in May,

ALLA NAZIMOVA

1906, she signed a contract to play in English in November of that year. Perseverance, hard study and close application enabled her to meet the terms of her contract, and she made her first appearance before a New York audience in Ibsen's *A Doll's House,* which was followed by *Hedda Gabler, Little Eyolf* and *The Master Builder.* A vaudeville tour in 1915, in which she appeared in a one-act play called *War Brides,* was highly successful and occasioned much favorable comment; in 1917 *'Ception Shoals* was equally well received, though the theme was morbid. When not busy on the stage Mme. Nazimova takes delight in landscape gardening; in private life she is the wife of an actor, Charles Bryant.

NE'BO, MOUNT, a mountain overlooking the land of Canaan, from the peak of which Moses saw the Promised Land, and on which he died and was buried (see *Deuteronomy* XXXII, 49). Mount Nebo is supposed to be Jebel Neba, a ridge eight miles east of the mouth of the Jordan River, on the eastern shore of the Dead Sea, near its northern end, and may have been a shrine of the Babylonian and Assyrian god, Nebo. The burial of Moses is the theme of a poem by Cecil Frances Alexander, a stanza of which follows. The poem succeeds well in giving an atmosphere of loneliness and awe:

> On Nebo's lonely mountain,
> By this side Jordan's wave
> In a vale in the land of Moab,
> There lies a lonely grave.
> And no man made that sepulchre,
> And no man saw it e'er,
> For the angel of God upturned the sod,
> And placed the dead man there.



NEBRAS'KA, the TREE-PLANTER STATE, a prairie state of great agricultural wealth, a region of golden fields of corn and grain and great, grassy plains, belonging to the north-central group of the United States. Its name is derived from a North American Indian word meaning *broad water,* which was given to the large river of the state, commonly known by its French name, the Platte, also meaning *shallow water.* The goldenrod, so abundant in Nebraska fields, has appropriately been chosen the state flower.

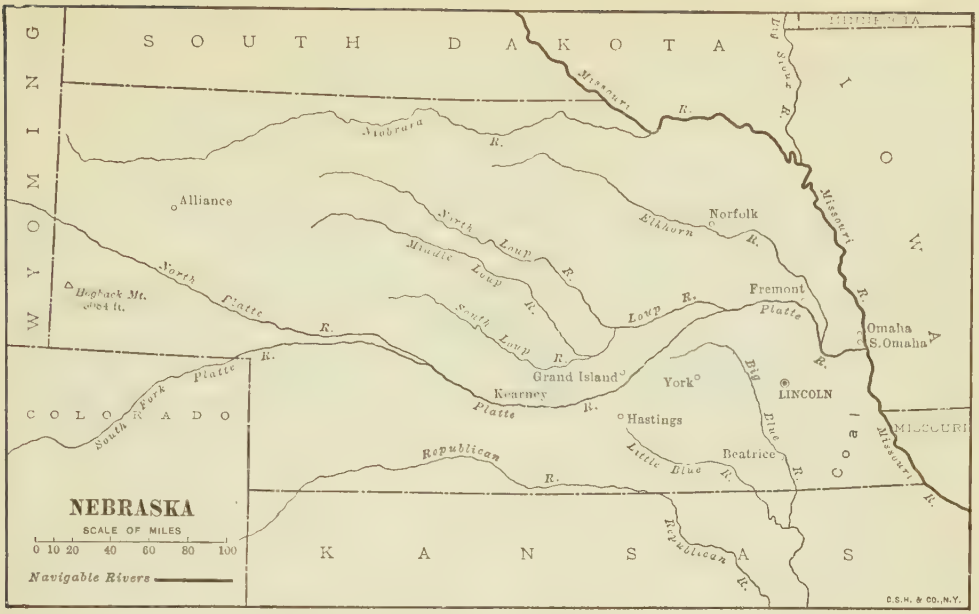
Size and Location. Ranking fifteenth in size among the states of the Union, Nebraska has an area of 77,520 square miles, which is only slightly less than that of South Dakota. The state is rectangular in shape, except where cut off on the southwest corner by Colorado and on the eastern border by the Missouri River. Its length from east to west is more than twice its width from north to south.

People. With a population of 1,296 372, averaging 16.9 per square mile, in 1920, Nebraska ranked thirty-first among the commonwealths of the United States. On January 1, 1910, the population was given by the Census Bureau as 1,192,214. About one-third of the foreign-born whites are from Germany. There are over 13,200 negroes in the state, and in 1920 there were 2,888 Indians, chiefly of the Omaha, Sante Sioux, Winnebago and Ponca tribes, against a total of 3,502 in 1910.

A large proportion of the population live in the southern and eastern counties, and the arid section of the west is very sparsely settled. Almost three-fourths of the inhabitants live on farms or in rural communities, and there are only five cities having a population of over 10,000. Omaha, of which the reported number of inhabitants in 1920 was 191,601, is the largest city, followed by Lincoln, South Omaha, Grand Island and Hastings.

Only about thirty per cent of the inhabitants of the state are church members. Over one-fourth of these are Roman Catholics, and the Methodist, Lutheran, Presbyterian, Christian, Baptist and Congregational denominations are next in order in numerical strength.

Education. The efficiency and excellence of Nebraska's school system is shown in the fact that the percentage of illiteracy (1.9) is lower than that of any other state in the Union, except Iowa and Oregon. Special attention has recently been given to agricultural training in



OUTLINE MAP OF NEBRASKA

Showing the boundaries, chief rivers, principal cities, and the highest point of land in the state.

the high schools, and since 1913 qualified high schools have given instruction in agriculture, manual training and domestic science. Textbooks are furnished by the state. The school fund is derived from the sale of public lands, state and local taxation, fines and forfeitures. The expenditure for public schools is over $10,000,000 a year.

The state maintains normal schools at Peru, Kearney, Wayne and Chadron, and a university at Lincoln (see NEBRASKA, UNIVERSITY OF). Other institutions of higher education, all of which are coeducational, are Bellevue College at Bellevue; Cotner University at Bethany; Union College at College View; Doane College at Crete; Grand Island College at Grand Island; Hastings College at Hastings; University of Omaha at Omaha; Nebraska Wesleyan University at University Place; York College at York. There is an agricultural school at Curtis and the United States maintains a school for Indians at Genoa.

A state board controls institutions of charity and correction, including schools for the blind at Nebraska City; an industrial school for juvenile delinquents at Kearney; an institution for the deaf and dumb at Omaha; asylums for the insane at Lincoln, Norfolk, Ingleside and Hastings; a hospital for crippled children at Lincoln; industrial schools for girls at Geneva and Milford; soldiers' and sailors' homes at Milford and Burkett; the penitentiary at Lincoln. In 1915 contract labor was abolished and instructive labor introduced in the state prison; all jails are required to provide labor for prisoners, if necessary hiring them to private persons. The care of neglected and dependent children is administered by a state board of control, and a public defender is employed by the state.

The Land. Nebraska lies in the region of the Great Plains at the base of the east slope of the Rocky Mountains. It rises uniformly from an elevation of 850 feet in the east, near the Missouri River, to the foothills and lofty, barren table-lands near the Wyoming border, which rise about 5,000 feet above the sea. In these hills are the highest peaks of the state, including Hogback Mountain, the highest point in the state, Wild Cat Mountain, Gabe Rock and Coliseum Peak, all rising above 5,000 feet. This northwestern part of the state consists of sand hills, Bad Lands and rough plains, where there is

* * * * * buffalo grass and the sage grass dry,
In the hot white glare of a cloudless sky,
And the music of streams is never heard.

Pine Ridge, a line of fantastically-shaped cliffs and buttes, gashed by cañons and bare of vegetation, extends across the northwest corner of the state. None of the shaftlike peaks or flat-topped hills of this region are of impressive grandeur, but in the wooded foothills, espe-

cially along the Snake and Niobrara river cañons, the scenery is picturesque and beautiful, and precipitous cliffs rise ninety feet above the waterfalls in the Niobrara near Valentine.

The Bad Lands of South Dakota extend into the northwest corner of Nebraska. They are rough plains of clay and slag, oddly formed and seamed by the action of wind and rain, and bare except for pockets of grass which are used as pasture land. East of the Bad Lands and north of the Platte River are the sand hills. In some places these hills rise in tiers, and except for hollows scooped out by the winds, they are covered with grass. The water absorbed by their porous, spongelike soil breaks out into many streams, springs and lakes.

In the central part of the state are great grassy prairies merging into the fertile farm lands of the eastern section, where, extending mile after mile, there are gently-rolling corn and grain fields, intersected by many streams.

Rivers and Lakes. The Missouri flows between wooded bluffs along the entire eastern border, and with its tributaries it drains the state. Its largest branch is the Platte River, crossing the state just south of the center and fed by the Loup and Elkhorn rivers and many small streams. In the south-central part of the state it divides, forming two branches, the North Platte, rising in Wyoming, and the South Platte, entering Nebraska from Colorado. The Niobrara, another large tributary of the Missouri, drains the northern part of the state, and the Republican, a branch of the Kansas, flows for some distance through the state just within the southern boundary. With the exception of the Missouri and the Niobrara, the rivers are slow and shallow.

Underlying much of the surface there is an unlimited supply of water which has percolated through the loose soil, and artesian wells are widely distributed. The "blowing-wells," or "weather-wells," found south of the Platte, are peculiar, for they "blow" or "suck" with the varying atmospheric pressure. Many of the wells furnish power for industrial and irrigation plants. There are numerous lakes and springs in the sand hills, and many small lakes and ponds border the Missouri, Platte, Elkhorn, Big Blue and other rivers.

Climate. The Nebraska skies are generally cloudless, the atmosphere dry and rare and the climate exhilarating. Although summer nights are cool, the glaring heat of midsummer days is disagreeable and the Gulf winds are oppressive. The temperature at times rises above 110° F. Extremes of cold also occur, and the winters though bright are generally severe. The snows are light, but an occasional blizzard from the Northwest strikes the state, causing damage among the herds on the open plains. In the extreme western part of the state the annual rainfall averages but twelve inches, and the whole west section is arid, but the rainfall in the east is sufficient for agricultural purposes. Nebraska is fortunate in receiving its rain during the growing season, and though the amount is comparatively small, it is effective. The annual precipitation averages twenty-three inches.

Agriculture. Nebraska is covered with a mantle of fertile soil and it is preëminently an agricultural state. In the eastern section great crops of Indian corn, wheat and oats are produced, and in the west and northwest regions, grasses grow in abundance; where the land is irrigated, other crops can be raised. In 1910 about three-fourths of the total land area was in farms. Corn is by far the most important crop, in the production of which Nebraska is surpassed only by Iowa, Illinois, Missouri and Indiana, in average years (see CORN).

Wheat, oats, alfalfa and other hay, potatoes, rye and barley are other large crops. In the production of wheat Nebraska rivals Minnesota, but is exceeded by North Dakota and Kansas. In the output of alfalfa the state is surpassed only by Kansas. Apples are the most important of the orchard fruits, though over 100,000 bushels of peaches and nectarines and nearly as large a quantity of cherries are produced. Grapes and small fruits, especially strawberries and blackberries, are also grown. Nebraska ranks fifth among the states in the value of its crops.

A greater variety of hay and forage is grown here than in any other state in the Union, and the vast pasture lands on the west and large crops of hay and corn of the eastern section furnish an abundance of feed for live stock, which is raised for the market. The value of the live stock of the state averages over $170,000,000 yearly, placing Nebraska among the leading states in the value of animal products.

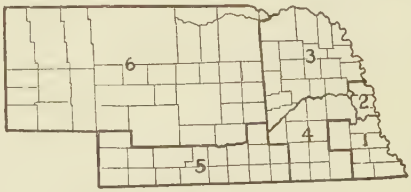
Irrigation. Irrigation is a fundamental problem in the development of the western part of the state. In many places wells supply the water, and in the sand hills the lakes furnish a source of water supply for irrigating systems. All irrigation projects, either completed or under way, include the watering of 951,000 acres.

Forests. Less than two per cent of the land area is woodland, but the state has been very

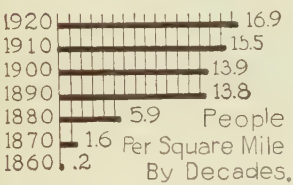
NEBRASKA

Library of State University

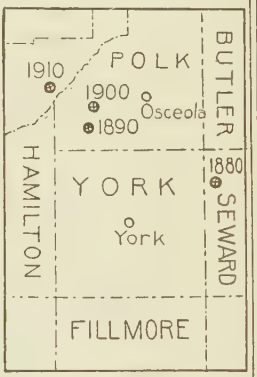
Irrigated Area.



Congressional Districts

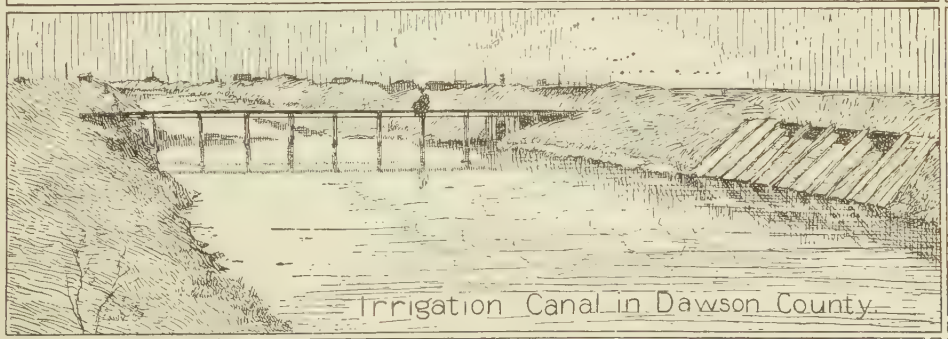


J. Stirling Morton
Father of Arbor Day.

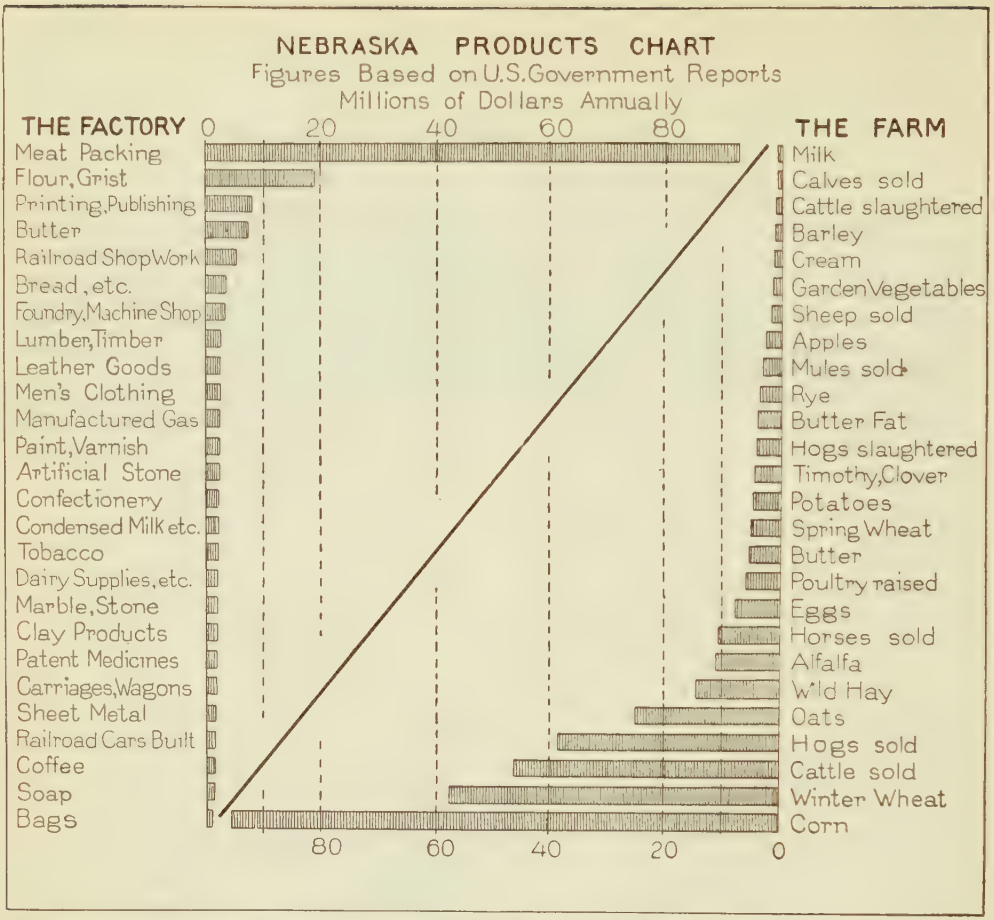


Center of Population.

Religion.



Irrigation Canal in Dawson County.



active in the forestation of its waste lands and prairies, and has so won its popular name of *Tree-Planter State*. Arbor Day (which see), now observed generally throughout the country, originated in Nebraska in 1872. All of the well-known trees of the north latitude are grown in the eastern part of the state; the bull pine grows in the highlands of the northwest; pines, cottonwoods and willows are being propagated in the sand hills, and red cedars border the streams.

Minerals. Nebraska produces about one-third of America's potash. A superior quality of clay of all colors for brick; a soft building stone; chalk rock used in the manufacture of hydraulic cement; pumice, sand, gravel, ocher, peat, lignite and mineral waters are produced. Metals are found, but in such small quantities as to be of no economic value.

Manufactures. Agriculture is not only the chief industry, but it is the basis of the state's manufactures and commerce. Being in the center of the cattle-raising and corn districts, slaughtering and meat packing, the chief industry of the United States, is by far the most important industry of the state. South Omaha, as a packing center, is outranked only by Chicago, and by the twin cities in Missouri and Kansas, each known as Kansas City. Nebraska wheat makes an excellent flour, and flour mill and gristmill products are second in importance. Printing and publishing, the making of malt liquors, car repairing and shop construction by the steam railroads, the production of foundry and machine-shop products, the manufacture of beet sugar, lumber and timber products and leather goods, vegetables, canning and dairying are also important. The creamery at Lincoln is one of the largest in the United States. Omaha, Lincoln, South Omaha and Grand Island are the largest manufacturing centers of the state. In 1920 the state had 2,884 manufactories, employing nearly 40,000 wage-earners and $245,257,000 capital.

RESEARCH QUESTIONS ON NEBRASKA

(An Outline suitable for Nebraska will be found with the article "State.")

Which of the following states are smaller than Nebraska: Alabama; Idaho; Georgia; Illinois; Kansas; Oklahoma; Minnesota; New York; Arkansas; Colorado; South Dakota?

Which of the following have a larger population: Washington; South Carolina; Maryland; Connecticut; Kansas; Colorado?

What two names are given to one of the largest rivers of the state? What similarity is there in the meaning of these names?

What is the state flower?

How many states were admitted to the Union between the close of the Revolutionary War and the admission of Nebraska?

Has this state more or fewer people to the square mile than the country as a whole? Than the Canadian province of Ontario? Than each of the states upon which it borders?

What other states were, in part at least, created from territory that originally formed part of Nebraska?

Why is not the western part of the state as thickly settled as the eastern? Does the larger part of the population live under rural or under urban conditions? What is the Indian population?

Of what territories has this region formed, governmentally, a part? What class of people was for a time forbidden to settle in Nebraska? Why?

In how many of the states can a larger percentage of the people read and write? How does the school system help the former?

What impression of the western part of this state was drawn from the accounts of the early explorers?

About how much higher is the loftiest point in Nebraska than the lowest? Is its greatest altitude higher or lower than that of Minnesota? Of Kansas? Of each of the states upon which it borders?

What stand has the state taken on the liquor question?

How large must a city be before it can make its own laws?

What are the Bad Lands? Why are there many springs, streams and lakes in the region of the sand hills?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with its neighbors on all sides?

What is there peculiar about the "blowing-wells" of Nebraska?

What is the main manufacturing industry of the state? How many cities in the country surpass in value of products of this industry the chief center in Nebraska?

What is there especially fortunate about the rainfall of this state? What is the pleasantest feature of the climate?

What holiday, now of national importance, originated in this state? What has the popular name of the state to do with this fact?

How many states surpass Nebraska in the production of its chief crop? How many surpass it in total value of crops?

How many square miles are included in the area irrigated or to be irrigated by projects already planned?

What Indian tribes are represented in the state?

How many constitutions has Nebraska had?

Transportation. There are good facilities for railroad transportation in the eastern and more thickly settled part of the state, but the western section has only one line extending from north to south. Three important railroads, the Chicago, Burlington & Quincy, Union Pacific and Chicago & North Western, cross the state from east to west. Other important lines are the Missouri Pacific; Chicago, Rock Island & Pacific; Chicago, Saint Paul, Minneapolis & Omaha; Saint Joseph and Grand Island. There are over 6,200 miles of steam road and 230 miles of electric railway in the state. All railroads are controlled by the state railway commission. Only three-tenths per cent of the public roads are improved. The Missouri River, extending 500 miles along the eastern border, is not navigable in this part of its course, and is practically of no commercial importance except at Omaha and Sioux City.

Government and History

Nebraska has had two constitutions, adopted in 1867 and 1875. Amendments may be proposed in either house of the legislature or by the people, but to become effective must be adopted by three-fifths of the members of each house and a majority of voters. Every male citizen twenty-one years of age and all those of foreign birth who have declared their intention of becoming citizens, thirty days preceding the election, are entitled to vote if they have been residents of the state six months immediately preceding elections. A preference may be expressed in the vote for President, Vice-President and United States Senators.

The *legislative body* consists of a senate and house of representatives, elected biennially. The senate consists of thirty-three members, and their number is never to exceed that limit; the house of representatives, in which there are now 100 members, has also reached its maximum strength. The initiative and referendum are in full force.

The *executive authority* is vested in a governor, lieutenant-governor, secretary of state, treasurer, attorney-general, superintendent of public instruction and commissioners of public lands and buildings, all of whom are elected for terms of two years. The treasurer is not eligible to three successive terms. Since 1915 it has been the governor's duty to present a budget of the revenues and expenditures for the ensuing biennial period.

The *judicial department* comprises the supreme court, six district courts, county courts, justices of the peace, police magistrates and such inferior courts as are created by law.

When the voters in a county approve, the county may organize townships. No new county may be created having an area of less than 400 square miles, and no county may be reduced to less than that area. Cities of 500 to 100,000 inhabitants may frame their own governments. The sale of intoxicating liquor is prohibited in all sections of the state, in accordance with a referendum vote taken in November, 1916. Previous to this there were stringent regulations which required early closing of saloons in cities. In 1920 the women of Nebraska for the first time will vote for electors of the President and Vice-President of the United States, in accordance with a law passed in 1916.

Territorial Government. There are stories that Coronado, in his search for the famous seven cities of Cibola, reached the southern boundary of the present state of Nebraska, and that Marquette passed the mouth of the Platte River in 1673, but the first known settlement was not founded until 1807, when a fur-trading post was established at Bellevue. The territory had been included in the Louisiana Purchase and had been visited by Lewis and Clark in 1804. Pierre and Auguste Chouteau, fur traders from Saint Louis, explored the Platte in 1807. In 1819, Stephen Long followed the Platte across the state, and his discouraging description of the semiarid plains of the western part of the present state gave rise to the myth of the Great American Desert.

After the founding of Bellevue, trading posts were established at Nebraska City and Omaha by the American Fur Company. When Missouri was made a state in 1821, Nebraska, which had been a part of Missouri Territory, was left practically without a government. In 1834 it was divided into three parts, one being included in Arkansas Territory, another part joined to the Territory of Michigan and a third part being placed under the jurisdiction of Missouri. The Territory was reserved as "Indian Country," and though settlement by whites was forbidden, some of the thousands of gold seekers crossing this territory on their way to California remained in Nebraska. The civilized Indian residents during 1851-1853 unsuccessfully petitioned Congress to organize a territory, and in 1853 the residents formed a provisional gov-

ernment. Nebraska then became the center of the struggle between the proslavery settlers of Kansas and the antislavery settlers of Iowa. In 1854 Douglas introduced a bill in Congress providing for the formation of two territories, Kansas and Nebraska, based upon popular sovereignty.

The Territory of Nebraska created by this bill extended from the Missouri River to the summits of the Rocky Mountains and from 40° N. latitude to British Columbia. The northern part of this region was included in Dakota Territory in 1861, a small section was joined to Colorado, and in 1863, when Idaho Territory was formed, Nebraska was practically reduced to its present limits. The territory was crossed by the Oregon, Old California and Old Salt Lake Trails, and by the famous "pony express" which extended from Saint Joseph, Mo., to Sacramento, Cal. Nebraska City became a great supply center for travelers over these routes. In the slavery struggle, Nebraska furnished 3,300 troops to the Union army, and after 1861 slavery was abolished in the territory.

Statehood. After being twice vetoed by the President, an act of admission was passed in 1867 and Nebraska was made the thirty-seventh state of the Union. The capital was moved from Omaha to Lincoln. Following the extension of the Union Pacific Railroad across the state, the land was "boomed" and prices were inflated, bringing about an economic collapse in the early nineties.

During its early history as a state, Nebraska favored Republican politics, but since 1896 the Democrats have increased in power, under the leadership of William J. Bryan. In the Presidential election of 1912, Woodrow Wilson received the majority of votes, and a Democratic governor, the second since 1892, was elected by a large majority. Several amendments were added to the constitution, including a provision for the initiative and referendum. In 1921 $2,000,000 was appropriated for soldier relief, a state budget system was adopted and a bureau of child welfare was created. E.B.P.

Consult Sheldon's *History of Nebraska; Proceedings and Collections* of the Nebraska Historical Society.

Related Subjects. The following articles in these volumes will be of interest in connection with a study of Nebraska:

CITIES

Beatrice
Fremont
Grand Island
Hastings
Lincoln
Omaha
South Omaha

HISTORY

Kansas-Nebraska Bill
Lewis and Clark Expedition
Louisiana Purchase

LEADING PRODUCTS AND INDUSTRIES

Alfalfa
Cattle
Corn
Dairying
Hay
Meat and Meat Packing
Oats
Wheat

PHYSICAL FEATURES

Bad Lands
Missouri River
Platte River

NEBRASKA, UNIVERSITY OF, founded in Lincoln, the state capital, in 1869, by act of the legislature, and opened two years later with the college of literature, science and arts. Some of the material for the oldest building, University Hall, was hauled in wagons from the Missouri River. This institution, which is at the head of the state educational system, comprises the graduate school, the college of literature, science and arts, the industrial college, which includes the schools of agriculture, mechanical arts and domestic science; the college of law; the college of medicine, the school of fine arts; the school of music, and the summer school. Tuition is free to residents of Nebraska except in the professional and art and music courses.

The control of the university is vested in a board of six regents. Funds are derived from a state tax, revenues from land grants, interest upon investments and tuition fees. The school of agriculture and an experiment station are located on a 320-acre farm about two miles east of Lincoln. Another university school of agriculture is located at Curtis, Neb. The experiment stations at Valentine, North Platte, Scotts Bluff and Culbertson are under university supervision. The medical school is located in Omaha. The university faculty numbers about 335, and the student enrolment is over 7,200. The library contains 124,000 volumes.

NEBUCHADNEZZAR, *neb u kad nez' ar,* an illustrious king of the Chaldean, or New Babylonian, Empire, in whose reign (605-562 B.C.) Babylon became one of the most splendid cities of the ancient world. He was the son of Nabopolassar, who founded the empire and thus paved the way for his son's renown. Much of the history of Nebuchadnezzar is related in the Bible, in *Kings, Jeremiah, Ezekiel* and *Daniel.* To punish the Jews for their repeated revolts, he laid siege to Jerusalem and in 586 B.C. captured that city. This date marks the end of the political life of the Hebrew kingdom, for the people were carried away by him into what is known as the "Babylonian Captivity"

(see JEWS; JERUSALEM). Nebuchadnezzar also carried on a siege of the Syrian city of Tyre, but was forced to abandon it after thirteen years. An inglorious invasion of Egypt was another of his military exploits, but he shines in history as a builder rather than as a warrior. The Great Palace in the royal section of Babylon, the famous Hanging Gardens (which see), the walls encircling the city, magnificent fortifications and a great temple bore witness to his devotion to the art of building (see BABYLON). In *Daniel* IV is an account of a strange form of madness that came upon him in the height of his glory, whereby he was "driven from men, and did eat grass as oxen." Nebuchadnezzar died at the age of eighty-four, and with him passed away the splendor of the New Babylonian Empire (see BABYLONIA, subhead *History*).

NEB'ULA, a luminous, cloudy spot in the heavens. Many apparent nebulae were resolved into star clusters after the invention of the telescope, but that true nebulae are cloudy masses of luminous gas, and not clusters of stars, was finally established by Sir William Huggins (1864). About ten thousand nebulae are known, but only the two brightest, those in the constellations of Andromeda and Orion, are visible to the naked eye. Nebulae vary in form, the one in Andromeda being oval, that in Orion very irregular, and others being ring-shaped or spiral. The smaller nebulae usually are brightest in the center and approach the oval in shape. Several double nebulae have been identified and others have been noted that vary in brightness. With the perfection of the astronomical camera many interesting photographs of these luminous patches have been obtained.

NEBULAR HYPOTHESIS, *neb'u lahr hi poth'e sis,* a theory advanced by the French astronomer Laplace to account for the formation of the universe. According to him the sun and all the planets were formed of a nebula or cloud of intensely-heated gas, which under the action of gravitation assumed a globular form. The mass gradually condensed and decreased in size, while the velocity of motion increased. Its whirling motion tended to flatten the globular mass at the poles; the continuing contraction then caused rings of nebulous matter to become detached and be thrown off into space, as in the case of the rings of Saturn or the earth's moon. The matter detached eventually collected into a globe, which continued to revolve around the central nebula from which it was cast off, as the moon revolves around the earth.

This theory was first suggested by Swedenborg, and then by Kant, and later was elaborated by Laplace, with whose name it is now identified. He did not investigate the formation of the original nebula, but confined himself to theories describing the evolution of the universe from the nebulous mass. The whole hypothesis is based on the discovery of the rings of Saturn, which are regarded as planets in the process of formation.

Planetesimal Hypothesis. The nebular hypothesis is no longer generally accepted by scientists. Among the more recent theories that have claimed attention is the *planetesimal hypothesis* of Chamberlin and Moulton (University of Chicago). They conceive the solar system to have been formed from a spiral nebula composed of gas, carrying innumerable solid bodies called planetesimals. These bodies, moving around the center in varying orbits, tended to gather together into planets and satellites. See EARTH; GEOLOGY, subtitle *The Story of the Earth.*

NECHO, *ne'ko,* an Egyptian king who reached the throne about 610 B.C. and died in 594. During his reign the Jews came into conflict with the Egyptians; in the Biblical record this king is referred to as Pharaoh-Nechoh. It was he who killed King Josiah of Judah, who placed Jehoiakim on the throne, and who exacted a heavy tribute of Judah. Nebuchadnezzar encountered him later, and with his superior army overthrew the Egyptians and forced them to give up the conquered territory. In his home government Necho was more fortunate. He had a canal built from the Nile to the Red Sea, and he sent out a fleet to explore the coast of Africa.

NECK'ER, JACQUES (1732-1804), a French statesman and minister of finance during one of the most troubled periods in the history of his country. He was of Swiss family, born at Geneva, but in 1747 went to Paris, where he later engaged in the banking business and gained a large fortune. By reason of several publications on financial subjects he was in 1777 made director-general of finances, and in this office the general faith in his business ability enabled him to borrow large sums which for a time bettered the affairs of the country and relieved him of the necessity of imposing increased taxes. He held a distinguished social position in the life of the capital, but his publication of a statement as to the financial condition of France displeased the king, and in 1761 brought about his dismissal.

He lived chiefly at Geneva until 1788, when he was recalled by Louis XVI to the offices of director-general of finance and minister of state. His part in the convening of the States-General increased his popularity, and his dismissal by the king in July, 1789, was the direct cause of the storming of the Bastille. This brought about his reinstatement, but he held office only until September, 1790, resigning because of the rejection of some of his financial schemes. Although an excellent business man, Necker had few of the qualities of a great statesman. Madame de Staël was his daughter (see STAËL-HOLSTEIN, ANNE LOUISE GERMAINE).

NECROMANCY, *nek'ro man si,* or the BLACK ART, is the exercise of an unhallowed power acquired by contact with the spirits of evil, which confers a control of supernatural forces. It was contrasted with *white magic,* which represents the more legitimate or beneficent use of like powers. Such beliefs go back to the oldest types of practices among primitive peoples, but were decidedly modified and attained their current meaning in connection with the popular interpretation of Christian dogma. See MAGIC; SUPERSTITION; WITCHCRAFT. J.J.

NECROPOLIS, *nek rop'o lis,* a word meaning *city of the dead* and thus a pleasing term for any large cemetery; but by literary usage it has become restricted in application to large cemeteries near centers of ancient civilization, from which the archaeologist gathers information concerning life and times of vanished people. The new world furnishes such a necropolis at Ancon, Peru, dating back to the days of Inca rule, from which most interesting details of native culture have been gathered. At Hallstatt, Austria, is a necropolis of the bronze age, thus long before the dawn of authentic history. The most of what is known of the Etruscans is derived from a study of their ancient cemeteries, of which those of Veii, Tarquinii and Clusium may be mentioned, all dating from centuries which preceded the rise of the Roman state.

But Egypt is preëminently the land of necropolises. The site of every center of royal authority in ancient Egypt, Memphis, Thebes, Sais, etc., marks the location of a necropolis. All pyramids and temples, not simply those of Gizeh alone, were surrounded by extensive cemeteries. Discoveries of far-reaching import are being constantly made in the same. They constitute the only source of information for times preceding the first dynasty at Memphis, probably 7,000 years ago.

NECTAR, *nek'tar,* in Greek mythology, the celestial drink of the gods, in which they pledged one another from cups brought by Hebe and Ganymede. It resembled red wine, and with ambrosia, the food of the gods, conferred youth, beauty and immortality.

NECTARINE, *nek'tar in,* or *nek tar een',* a fruit belonging to the rose family which has probably been developed, with the peach and almond, from a wild almond tree of Southwestern Asia. The nectarine is occasionally found on peach trees, merely as the result of bud variation. The tree grown from the seed of such fruit, almost without exception, "comes true;" that is, it bears nectarines. The smooth, glossy surface of the nectarine is its main difference from the peach. Although exported to some extent from California, its commercial value is not so great as that of the peach. The nectarine tree thrives in all regions in which the peach flourishes. See PEACH.

NEEDLE, *ne'd'l.* The next time you pick up a sewing needle, remember that this little piece of steel, with a fine point at one end and an eye at the other, has passed through the hands of seventy workmen and undergone twenty-two processes in its manufacture. The coils of wire are cut into pieces long enough for two needles. These pieces are then heated to a dull red and rolled on a flat steel plate to straighten them. The wires are then pointed at each end on a grindstone, being held in place by a device which causes them to revolve while in contact with the stone so that the points are fine and even. Only one end is pointed at a time. The next step consists in stamping the wires in the middle by a machine that forms the flat place for the eyes, which are punched by another machine. These pieces of wire have now become double needles, held together by a thin film. A wire is now run through the eyes and the needles are cut apart and the head or eye end is rounded and smoothed. The remaining processes consist in tempering, polishing, sorting and packing the finished product for the market.

Sewing needles are usually put up in papers of twenty-five each, and a dozen of these papers form a package. The sizes are indicated by numbers, and papers for general use contain several sizes. England is the chief center for the manufacture of sewing needles. They are also made in other European countries, France ranking next to England in their manufacture. The value of sewing needles imported into the United States in normal years is about $500,000.

Sewing-machine needles are made in the United States. They have the eye near the point and a groove on one side for the thread. A crochet needle has a hook near the point. Some needles used in sewing shoes are curved, forming a part of a circle. Some needles used by surgeons are also curved. Thorns and pointed sticks were first used by the ancients, and needles of bone are still in use by uncivilized people. Stone needles have been found among the relics of the ancient Egyptians.

NEEPAWA, *ne'pa wa,* a town in Manitoba, the center of a rich agricultural district and an important railway junction point. It is a division point on the Canadian Northern Railway, and is also on the Canadian Pacific short line between Winnipeg and Edmonton. It is 134 miles west of Winnipeg, sixty-one miles west of Portage la Prairie and seventeen miles east of Minnedosa. The Canadian Northern shops, a large oatmeal mill, a machine shop, brickyard, creamery and sash-and-door factory are the principal industrial establishments. The town owns its waterworks and electric light system. The summer fair of the Northwest Agricultural and Art Association is held here. In the Riding Mountains, northwest of Neepawa, is an abundance of game. Population in 1911, 1,864; in 1916, 1,854.

NEG'ATIVE QUANTITY, a quantity taken in a sense opposite to that chosen as positive. For example, if a dollar owned be declared to constitute a positive quantity, then a dollar owed will be a negative quantity. If a number of degrees above zero on the thermometer be thought of as positive, the corresponding number of degrees below will be negative, and so on. The mathematician has considerable use for such fictitious negative quantities, which he indicates by the symbol —. In the mathematical expression 6—8, an impossible operation is indicated, if we think only of positive quantities. The mathematician meets this difficulty by supposing numbers to exist below zero and to be of such a character that, when they are added to positive numbers, the latter are caused to diminish instead of being increased. (For example, —6 added to +8 gives a result of 2, or +2.) He conceives such negative numbers to proceed from zero to infinity. The operations and principles involved in the solution of problems containing negative quantities are explained and illustrated in the article Algebra. See, also, Number.

NEGAUNEE, *ne gaw'ne,* Mich., a center of the iron-mining industry, situated in Marquette County, near the northern coast of the Upper Peninsula, twelve miles southwest of the city of Marquette and three miles east of Ishpeming. It was in this locality that the iron ore of the Lake Superior region was first discovered; the ore was mined here as early as 1854, more than twenty years before any other range in this region was opened. Negaunee is located about 1,450 feet above the surface of Lake Superior, on a ridge called the Iron Mountain, where the deposits of ore are extensive and of good quality. There are several highly productive mines within the city's limits. The place was settled in 1846, was incorporated as a village in 1865 and received its city charter in 1873. The Chicago & North Western, the Duluth, South Shore & Atlantic and the Lake Superior and Ishpeming railroads serve the city. In 1910 the population was 8,460; it had decreased to 7,419, a loss of twelve per cent, by 1920. The area of the city is nearly fourteen square miles.

NEGLIGENCE, *neg' li jens.* A railroad company engaged John Smith to guard a dangerous crossing in a city. Smith entered a near-by store and failed to warn an automobile of an approaching train. The automobile was struck, and those in it were seriously injured. Because Smith failed to do his duty he was convicted in court of *gross negligence.*

Mr. A set fire to some brush on his land on a windy day in time of drought. The wind was blowing towards B's house on an adjoining farm; brands from the burning brush set B's house afire, and it was destroyed. The court ruled that A failed to use ordinary caution in setting fire to the brush under existing conditions and that B was entitled to damages.

Negligence, in law, is failure to do what a man of ordinary judgment and prudence would do, when it is evident that such omission will result in injury to another; or it is failure to do what a contract specifies should be done. Smith omitted to do the thing he was hired to do and A was grossly careless or negligent in setting fire to his brush. Negligence presupposes legal obligations which warrant the injured party in bringing suit for damages, but the burden of proof rests with the party bringing the suit. When the case is so clear that there is no doubt of the negligence of the defendant the case may be decided by the court, but the determination of the fact of negligence is usually left to the jury. When evidence shows that the defendant was not negligent the case is dismissed. If the plaintiff was contribu-

tory to the negligence of the defendant he cannot recover. Had Smith warned the automobile, and had the driver attempted to cross the track regardless of the warning, his act would have been considered as *contributory negligence,* and the railroad company would not have been liable.

Consult Shearman and Redfield's *Treatise on the Law of Negligence.*

NEGOTIABLE, *ne go' shi a b'l,* **PAPER,** written contracts payable to order or bearers, and treated as security for, or representative of, money. Negotiable paper may be transferred by endorsement or delivery, and the receiver or assignee of the contract has a claim in his own name and without notice against the maker. The best-known form of negotiable paper is the bank check, which was also the latest to come into general use. A check may pass through the hands of an indefinite number of persons, each of whom accepts it in place of money. Any holder of the check may claim payment from the maker. In addition to checks the commonest forms of negotiable paper are drafts and bills of exchange, promissory notes, bank, exchequer or treasury notes, and government and corporation bonds. The pass book of a savings bank, however, is not transferable.

Its Characteristics. As defined above, negotiable paper must be payable *to order* or *to bearer.* In other words, if John Doe makes a note payable to "Richard Roe," the note is not negotiable and Richard Roe is the only one who can collect it. If, on the other hand, the note is payable to "Richard Roe, or order," the note may be transferred. Negotiable paper represents money, not goods. A bill of lading or a warehouse receipt, on the contrary, represents commodities. By the laws of most civilized countries a bill of lading may be assigned while the goods are en route, or a warehouse receipt while the goods are in storage, but such paper is not negotiable, for it does not represent money and cannot perform the functions of money. This difference is most important in the transfer of ownership, for the ownership of negotiable paper is vested in the holder. This means that a thief or finder can convey perfect title to negotiable paper, but if he conveys a stolen bill of lading the purchaser or assignee gets no better title to the goods than he would if he received the stolen goods.

How Title Is Transferred. A negotiable instrument may be transferred either by endorsement or by delivery. A check, for example, if made payable to bearer, may be transferred merely by delivery. It is customary, however, to endorse even such paper as is payable to bearer.

Endorsement. An endorsement or indorsement, in its broadest sense, is any writing on the back of a paper; the word comes from the Latin *in dorso,* meaning "on the back." In a technical sense the term applies only to the signature or other writing which indicates the transfer of a negotiable instrument. Ordinarily such writing is on the back, but it is legal if made on the face of the instrument.

An endorsement may be written in a variety of ways. If the holder of the paper merely signs his name, the endorsement is said to be *in blank.* A *special endorsement* or an *endorsement in full* specifies the person to whose order payment is to be made, thus: "Pay to A. B., or order, (Signed) C. D." Another form of endorsement is called *restrictive,* because it restricts further negotiation, thus: "Pay to First National Bank, only." Modern English and United States law emphasizes the negotiable character of the instrument, and the party who is required to pay may disregard any conditional endorsement, whether or not the condition has been fulfilled, and may pay the required amount to the endorsee.

Ordinarily every endorser of a negotiable instrument is liable for its face value if the maker is unwilling or unable to pay it. If the endorser wishes to avoid this liability he may add the words "without recourse." This form of endorsement does not affect the validity of the paper or prevent further endorsement. A.E.R.

Consult Tompkins' *The Law of Commercial Paper;* Ogden's *Law of Negotiable Instruments.*

Related Subjects. The reader is referred to the following articles in these volumes:

Bill of Exchange	Check
Bill of Lading	Draft
Bond	Note

NEGRITOS, *ne gre' tohz,* a negroid race found chiefly in the Philippines, the Andaman Islands and the Malay Peninsula. They form one division of the pygmies, people whose most pronounced characteristic is their short stature. For details, see PYGMIES.

NE'GRO, from the Latin *niger,* meaning *black,* the name properly applied to the native races of Africa, excepting the Egyptians, Berbers, Abyssinians and, some authorities insist, the Hottentots. The term *negro race* is generally used as synonymous with *African race,* but such a designation is not strictly true. The characteristics of the negro race are a dark skin,

woolly hair, a flat nose, thick lips and a tall body, with long arms and legs. Africa from the Sudan southward to the Tropic of Capricorn is the native land of the negro, but these people have been carried to nearly all parts of the globe. In 1619 twenty negroes were taken to the American colonies and sold as slaves. Previous to this the Spaniards had brought negroes to the West Indies and sold them into slavery. The project was successful from a financial viewpoint, and the importation of negroes into the United States continued until 1808, when it was prohibited by the Constitution. At the close of the War of Secession there were about 4,000,000 negroes in the United States, and their numbers have continued to increase; in 1910 there were over 9,800,000 in the country. Cuba, Haiti, San Domingo and Jamaica have a large proportion of negroes among their population.

Education of the Negro. During the period of slavery, no effort was made by the Southern states to educate the negro, and the problem was not seriously presented until the issue of the War of Secession had made of him a citizen. Church societies of the North initiated educational work, the teachers being very largely young men and women from that section. Of such institutions, Hampton Institute, established in 1861, may be regarded as typical. Independent instruction was supplemented by governmental agency during the five years' life of the Freedmen's Bureau, which was opened in 1865. Many wealthy men gave generously to the cause.

Experience soon showed that the best instructors of the negro were men of his own race, who understood his temperament and his needs. To train such instructors a number of normal schools and colleges were opened in the decade following 1868. Men like Booker T. Washington appeared, the natural leaders of their people. With a more intimate knowledge of the economic and social needs of the colored people, they never ceased to emphasize the wisdom of specific industrial training, and they had little difficulty in showing that the traditional bookish drill of the white schools must be greatly modified. Within recent years the negro schools of the South have devoted most of their efforts to training their students to take a part in the agricultural and industrial development of the country. They have not tried to turn out scholars trained in Greek and Latin and the other so-called cultural studies, but skilled farmers and mechanics. As a result of such methods not only have the negroes developed greater efficiency and self-reliance, but the stubborn opposition which the first educators of the negro had to encounter has subsided also. In some parts of the South negroes trained in the newer industrial schools have formed flourishing communities of their own.

It may be said that the status of the negro in the South is now more encouraging than it has been at any previous time since the War of Secession. Free public schools for the negro exist in all the Southern states, and public-spirited men from the South have united with those of the North in organizing the General Educational Board and the Southern Educational Board to promote the training of the negro for citizenship and life. The influence of such higher institutions of learning as Fisk University at Nashville, Howe University, Atlanta University, and the normal and industrial schools at Tuskegee and Hampton, permeates the entire educational fabric and is rapidly establishing new ideals and aims for the children and grandchildren of former slaves.

The total enrolment of colored children in schools of the South is about 1,770,000, over half the colored school population. About 25,600 students are taking secondary courses, and nearly 30,000 are enroled for collegiate and professional courses. G.B.D.

Consult DuBois's *The Souls of Black Folks;* Dennett's *Nigerian Studies;* Washington's *The Study of the Negro.*

Related Subjects. The reader is referred to the following articles in these volumes:

Freedmen's Bureau	Slavery
Hampton Normal and Agricultural Institute	Tuskegee Normal and Industrial Institute
Peabody Education Fund	War of Secession
Slater Fund	Washington, Booker T.

NE'GUS, the native title of the king or emperor of Abyssinia, his full title being *negus negusti,* meaning *king of kings.* Negus is also the name of a drink common in the early part of the eighteenth century, and named after its inventor, Colonel Francis Negus (died 1732). It was usually made of port, mixed with a little lemon juice, sugar and hot water.

NEHEMI'AH, a Jew born during the Babylonian captivity, and as a youth cupbearer to Artaxerxes, king of Persia. Having besought the king with regard to the unprotected state of his kinsmen in Judea, he was made governor of that province. An account of his subsequent work is given in the book of *Nehemiah,* the latest of the historical books of the Old Testament. He rebuilt the walls of Jerusalem, took

an active part in securing the adoption of the Law by the returned exiles, held a great feast at the dedication of the walls of the city and contended for the strict observance of legal rites. He emphasized churchly rather than national issues.

NEIGHBORHOOD, *na'ber hood,* **CENTERS.** See COMMUNITY INTERESTS.

NELSON, a city in the southeastern part of British Columbia, the capital and largest city of the Kootenay district. It is located on the west arm of Kootenay Lake, which is navigated by steamers running to Kasle, Kootenay Landing and other points. The city is also served by the Spokane line of the Great Northern Railway and by several branches of the Canadian Pacific Railway, one of which connects with the Kettle Valley Railway at Midway. Midway is 127 miles west of Nelson, Vancouver is 513 miles west and Spokane is 199 miles southeast. From Nelson to Revelstoke, on the main line of the Canadian Pacific, is a distance of 184 miles by rail and steamer. Kootenay Landing, the western terminus of the Crow's Nest branch of the Canadian Pacific, is sixty miles southeast by steamer. Population in 1911, 4,476; in 1921, 5,230.

Nelson is the commercial center of the Kootenay country, a section noted for minerals, lumber and fruits. The mines of this district produce gold, silver, copper, lead, zinc and other minerals to a value of $20,000,000 a year. The chief industrial establishments of the city produce iron, cigars, jam, soda water, marble, mattresses, boxes and boats. Saw and shingle mills are conspicuous both in the city and in the neighborhood. Nelson is a division point on the Canadian Pacific, and has railway repair shops. The municipality owns the hydroelectric light and power plant, gas and water systems, and the street railway. Not far away are many places of scenic interest, including glaciers, hot springs and cataracts, and there is also an abundance of game birds and large game.

NELSON, HORATIO (1758-1805), the most famous of British admirals, who, with his right arm and his right eye gone, won the greatest victory in English naval records. He was born in Burnham-Thorpe, Norfolk, England, September 29, 1758; his father was rector in his native town, and his mother was a descendant of the famous Walpole family.

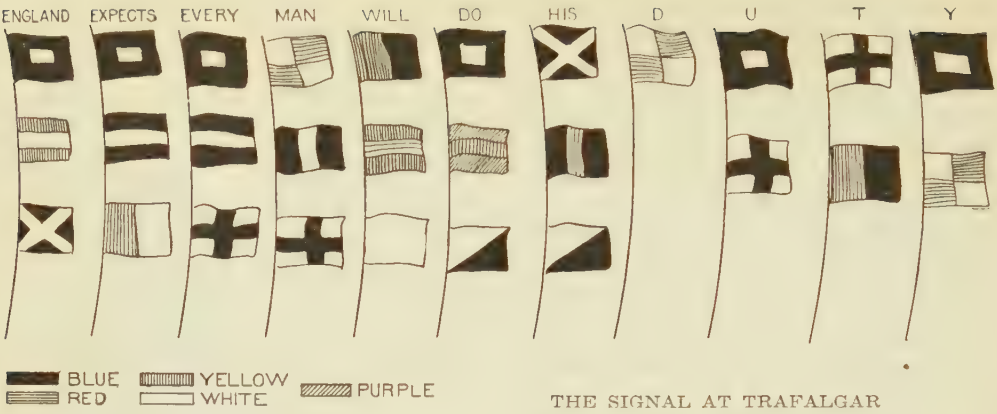
Though the boy was sickly and possessed little endurance, he had an ambition to go to sea. So when his maternal uncle, Capt. Maurice Suckling, set sail for the Falkland Islands, Horatio, who was only twelve years old and had but little education, begged to be allowed to accompany him. His uncle, though not approving of the plan, yielded; and it was to his guidance that Nelson owed the excellence of his early training.

LORD NELSON
His signal at Trafalgar, "England expects every man to do his duty," has inspired British seamen for over a hundred years.

When fifteen years old, he was permitted to go as coxswain on an expedition to the North Pole. A trip a little later to the West Indies resulted in a fever, which left his health seriously undermined. At nineteen, the commission of second lieutenant was given to him; in 1778 he was made commander, and the following year post captain. A cruise to Central America brought on a second protracted illness and a return to England.

In 1783 Nelson was given command of the *Boreas,* stationed in the West Indies, and he served there until 1787. During this period he disregarded the orders of his commander, Sir Richard Hughes, who forbade him to enforce the Navigation Laws against America. Though this situation caused Nelson considerable trouble and anxiety, he was later upheld by the British government. While in the West Indies he married the widow of Dr. Josiah Nisbet, and his bride was given away by Prince William, England's future king. Shortly afterwards Nelson was recalled from active service and remained on the retired list until the outbreak of the war between England and France, in 1793. Then, in command of the *Agamemnon,* he rejoined the Mediterranean fleet. He was promptly sent to blockade the principal strongholds of Corsica, and in the victories which followed took an important though necessarily subordinate part. At Calvi, one of the blockaded ports, he received a wound which deprived him of his right eye.

Nelson next distinguished himself at the Battle of Cape Saint Vincent (1797) and was rewarded by knighthood in the Order of the Bath; just before this battle he had reached by regular promotion the rank of rear-admiral. He



THE SIGNAL AT TRAFALGAR

suffered but one real defeat, that of the Battle of Santa Cruz; and it was in this battle the wound was received which cost him his right arm.

A period of brilliant successes followed Santa Cruz, which includes the three great victories of Aboukir, Copenhagen and Trafalgar. When the French began to concentrate their forces against Great Britain, Nelson was sent to watch the French ships at Toulon. Because of a mishap they escaped, and Nelson started on a long and tedious pursuit, finally locating the fleet in the Bay of Aboukir, where he completely routed and destroyed it. This victory brought him plaudits from all over the world, also the title of Baron of the Nile and a pension of £2,000

FLAGSHIP "VICTORY"

($10,000). It was in this period of his life that he met Sir William and Lady Hamilton, and brought upon himself the one blemish on his career, through his admiration for the latter.

In 1801 Nelson hoisted the flag of a rear-admiral, and under command of Admiral Parker sailed for Copenhagen. The British claimed the right of belligerents to search neutral ships for contraband of war, which Denmark, supported by Russia, refused. After a council of war Nelson was appointed to make the attack on the Danish fleet. When Parker saw what appeared to threaten an unfavorable outcome, he gave the signal of recall. Nelson, believing in his ability to win, disregarded the order, and turned what might have been a crushing defeat into a great victory.

In May, 1803, as commander-in-chief of the fleet, Nelson once more went in search of the French; his flagship was the *Victory*. As the French fleet slipped out of the harbor of Toulon, he began his famous pursuit, which ended in the battle of Trafalgar, on October 21, 1805. In this engagement the combined French and Spanish fleets were destroyed by twenty-seven English vessels. It was the greatest conflict of the age, but Nelson received his death wound, living only long enough to know that he had won the most brilliant victory of his life. The guns ceased firing as he drew his last breath. It was during this battle that the memorable signal to the fleet was displayed, "England expects every man to do his duty."

Nelson's motto was "Strike quick—and home," and his masterful comprehension and prompt action saved many a critical situation. His frail body was animated by an indomitable spirit.

Consult Mahan's *Life of Nelson*.

NELSON, Wolfred (1792-1863), a Canadian physician and political leader, who took a conspicuous part in the Lower Canada Rebellion of 1837. Dr. Nelson was born in Montreal, where his father, an English army officer, was stationed. The boy received a good education, studied medicine, and in 1811 began to practice. During the War of 1812 Dr. Nelson served as a surgeon with the British army. He then practiced without interruption until 1827, when he

was elected as a Reform member of the Lower Canada assembly. He labored earnestly to secure some readjustment of political rights for his province, and was soon recognized as one of the foremost Radicals in Canada. In 1837 Papineau persuaded him to take a hand in the revolt. Nelson was in command at Saint Denis, Lower Canada, when the rebels won a victory over the government's forces. Later he was captured and, by the Earl of Durham's order, was banished to Bermuda. He was released after a year, and until 1842 made his home at Plattsburg, N. Y.

The proclamation of amnesty in 1842 opened Canada to Dr. Nelson. He at once returned to Montreal, where he won new honors and showed his ability and his high character to better advantage. In 1854 and 1855 he sat in the Lower Canada assembly. Later he was for several years inspector of prisons, was twice elected mayor of Montreal, and as head of the Lower Canada College of Physicians and Surgeons held a high place in his profession. The indiscretions of his youth were forgotten in the solid achievements of his mature years.

NELSON RIVER, the largest river in Manitoba. It forms the lower course of the great Saskatchewan River, which rises on the eastern slopes of the Rockies, flows across the plains of Alberta and Saskatchewan, and finally empties into Lake Winnipeg. The surplus waters of this system, as well as of the Red and Winnipeg rivers, are carried from Lake Winnipeg to Hudson Bay by the Nelson River, which issues from the northern end of the lake. It is a deep, broad and swift stream, carrying an enormous volume of water and having an average fall of nearly two feet per mile, throughout its length.

The Nelson is navigable for small steamers for about sixty miles below its outlet from Lake Winnipeg. The lower course for seventy miles from the mouth is also navigable for small steamers or gasoline launches, but the middle course is broken by numerous rapids and heavy falls, and is navigable only for canoes. At the mouth of the Nelson is Port Nelson, the terminus of the Hudson Bay Railway, and near it is York Factory, an old trading post. The Nelson is 430 miles long from Lake Winnipeg to its mouth, and is 1,700 miles long from its mouth to the headwaters of the Saskatchewan. The entire drainage basin of this river system covers 370,800 square miles, an area one and one-half times that of the province of Manitoba. J.B.T.

NELUM'BO, a genus of plants which grow in fresh water and resemble the water lilies, the best-known representatives of which are the lotuses, particularly those of China and Egypt. The fleshy roots and the seeds and stalks of the lotus are used as food by the Chinese, the roots furnishing Chinese arrowroot. In China this is pickled with salt and vinegar and used to flavor rice, or is powdered and made into soup. In India, where the lotus is held sacred, the fiber of the dried stalk is used as a wick for the temple lamps. *Yellow nelumbo* (also called *lotus, sacred bean* and *water chinquapin*) is an American species found occasionally in the Middle United States and in the eastern part of the country. The leaves are from eighteen to twenty inches across and are borne on tall stems. The yellow flowers are from one to five inches in diameter. See LOTUS.

NELUMBO

NEMEAN, *ne me'an,* or *ne'me an,* **GAMES,** one of the four Greek national festivals, held at the shrine of Jupiter or Zeus, in the valley of Nemea in Argolis. The Nemean games were celebrated every other year in midsummer, and the competitive exercises were athletic contests, horse racing and playing the cithara, the ancient Greek harp. Each winner was given a palm branch and a crown of parsley. The games were said in legend to have been instituted by Hercules in honor of his father, Jupiter, but later they became a feature of the worship of Hercules himself. It was in the Nemean forest that the hero performed the first of his twelve labors—the slaughter of the lion (see HERCULES). The first series of games recorded in the historical period was celebrated in 573 B. C. See OLYMPIAN GAMES.

NEMESIS, *nem'e sis,* in Greek mythology, the goddess of vengeance, who represented the just anger of the gods. She was especially inflexible in her attitude toward those who were proud and insolent and did not pay to the gods proper reverence. To-day the word means retribution or retributive justice, an exact distribution to every man according to his deserts.

NEPAL, or **NEPAUL,** *ne pawl',* an independent kingdom in Northern India on the southern slope of the Himalaya Mountains, lying south of Tibet and north of British India. Its area, about 54,000 square miles, exceeds that of England. The northern part of the country is a lofty highland which contains some of the highest mountains in the world, among them mounts Everest and Dhawalaghiri, but the southern part is a broad, fertile plain watered by the Karnali, Gandak and Kosi rivers, where thousands of small, intensively-cultivated farms produce rice, tea, sugar cane, tobacco and cotton.

LOCATION MAP

Nepal is the long, nearly east to west strip shown in solid black between India and China.

Among the mountain ranges of the north, where there is small opportunity for farming, every foot of land in the narrow valleys is used; the hillsides are terraced, and the mountain streams utilized for irrigating, and there are grown in this region the hardier crops, such as barley, corn, wheat, buckwheat and pulse. Though pastures are scarce, the few sheep raised are noted for their fine wool. There are mines, too, containing rich deposits of iron, lignite, copper, lead and zinc; these, however, are but little worked. The great forests on the mountain sides are another almost untouched source of wealth. In the cities of the lowland, chief among which are Khatmandu, Patan and Bhatgaon, coarse cotton cloth, bells and other metal ware, pottery and a very strong, heavy paper are manufactured.

The people of Nepal are of many tribes and races. Before the fourteenth century the land was inhabited mostly by scattered, half-savage tribes of Chinese origin, but in the fourteenth century the Hindus began coming in from the south. They settled in the fertile lowlands, intermarried with the natives, founded cities, built temples to the Hindu gods, developed the fields and organized many petty kingdoms. They came to be called *Newars* and their country *Nepal.* The Newars, who constitute the largest division of the population, are a rather small, robust people, with the flat face, yellow complexion and oblique eyes of their relations, the Chinese.

The ruling class in Nepal consists of a Hindu race known as the Gurkhas, who invaded the country in the twelfth century and permanently settled there late in the eighteenth century. They are a brave, warlike people, who, since their war with the British in 1814, have remained on friendly terms with England. The latter country has established a British residency at Khatmandu, the Nepalese capital. The Gurkhas form twenty battalions of the native army of the Indian Empire, and in the War of the Nations they rendered valued service to the British government. The total population of the country is estimated to be about 4,500,000.

NEPHRITE, *nef'rite,* a term sometimes used for jade (which see).

NEPHRITIS, *ne fri'tis,* the general name for any inflammation of the kidneys. The disorder may be sudden, transitory and easily relieved, or slow, gradual and incurable. A common form of nephritis, known as *Bright's disease,* is discussed under that title in these volumes. A serious complication of nephritis is poisoning from reabsorption of the waste material which the kidneys have failed to carry off; this malady, known as *uraemia,* or *uraemic poisoning,* has as its characteristic symptoms—drowsiness, stupor and convulsions. Nephritis may be either the result or the cause of heart disease, and any of its forms should have the prompt attention of a physician. See KIDNEYS.

NEP'IGON. See NIPIGON.

NE'POS, CORNELIUS, a Roman historian who lived in the first century B.C. Nothing is known of his life except that he was probably born at Verona and was a friend of Cicero and Catullus. Only one of his works survives, and some scholars question the authenticity of it. It is a series of biographies, twenty-five in number, of illustrious men of various nations. The facts of these lives as given are not always trustworthy, but the language is so clear and concise that the work has been much used as a textbook in Latin, and many excellent editions of it have been issued.

NEPOTISM, *nep'o tis'm,* the name given to a practice whereby rulers grant official favors to members of their families. In Latin it means, literally, *nephew-ism.* The word was coined to describe the practice of certain Popes, especially those who reigned during the two centuries before the election of Alexander VII in 1655. During this period nearly every Pope appointed his nephews and other relatives to positions of importance, no matter what the

cost to the treasury, which could always be filled by increasing the taxes levied on the common people. Pope Alexander, the first great enemy of nepotism, said that the Barberini family, relatives of Urban VIII (1623-1644), had alone burdened the Papacy with interest charges to the amount of 483,000 scudi a year, nearly one-fourth of its income. The results of nepotism kept the Papal states near to bankruptcy till the nineteenth century. To-day nepotism refers to the appointment of his relatives to office by one in official position.

NEP'TUNE, the Roman name for the god whom the Greeks called Poseidon, the brother of Jupiter, and second only to him in authority. When the universe was divided Neptune received the seas, the rivers and the fountains—in fact the waters everywhere. Two stories of Neptune were great favorites with the Greeks. The first describes the contest between him and Minerva, in which the one who created the more useful object would be privileged to name the new and growing city of Athens. Neptune created the horse, and pointed out proudly the many ways in which it would be useful to man, but Minerva made the olive tree and convinced the judges that it was the more valuable of the two. From her Greek name, Athene, the city was called Athens.

Hail, Neptune, greatest of the gods!
Thou ruler of the salt sea floods;
Thou with the deep and dark-green hair,
That dost the golden trident bear;
Thou that, with either arm outspread,
Embosomest the earth we tread:
Thine are the beasts with fin and scales,
That round thy chariot as it sails,
Plunging and tumbling, fast and free,
All reckless follow o'er the sea. —ARION.

At another time Neptune, dissatisfied with his kingdom, attempted to gain control of Jupiter's, and as punishment was condemned to build for Laomedon, king of Troy, the walls of his city. Apollo aided Neptune by playing on his lyre, so that the stones sprang into place, and the task was quickly completed. The treacherous king, however, refused to give to the two gods the promised payment, and in consequence both Neptune and Apollo fought against the city in the Trojan War. Neptune was especially worshiped by sailors and those who had to do with horses, and games were celebrated in his honor, the most important being the Isthmian Games, which were held every four years at Corinth. In art Neptune is shown as a majestic man with broad chest and well-developed muscles; in his hand he carries a three-pronged spear, or trident, his special symbol. He is usually drawn through the water by dolphins, and Triton, his son by Amphitrite, accompanies him. See MYTHOLOGY.

NEPTUNE, named for Neptune, the god of the sea in Grecian mythology, is a planet that is never visible to the naked eye. About it little is definitely known, except that it is the outermost planet of the solar system, so far as man is able to determine. Its discovery, considered one of the greatest triumphs of astronomy, was brought about by the study of the planet Uranus, which showed eccentricities which led astronomers to believe it was being acted upon by some invisible body. Two astronomers, Leverrier and Adams, were able by deduction and mathematical calculation to determine what body could produce the variations noticed and where that body was to be found. The result was the discovery of Neptune, just where these two astronomers had, independently of each other, stated it would be located. Soon afterwards it was found that the planet has one moon, revolving around it from east to west.

Neptune is at an average distance of 2,800,000,000 miles from the sun. Its diameter is about 30,000 miles, some authorities stating it as 33,000 miles, or nearly four times as great as that of the earth. The planet completes its journey round the sun in 164 years, traveling in its orbit at the rate of about three and one-half miles per second. Through a telescope, Neptune appears to have a disk of a greenish color. Its mass is about eighteen times that of the earth, and its *albedo,* or reflecting power, is a little less than that of Venus. As to its rotation on its axis, nothing is definitely known. The earth receives 900 times as much light and heat from the sun as are conveyed to far distant Neptune.

For comparative size of Neptune and the other planets and distances from the sun, see PLANET; see, also, ASTRONOMY.

NERBUDDA, or **NARBADA,** *nur bud'ah,* a river in India which the Hindus hold in special reverence, regarding it in sacredness as second only to the River Ganges. Along its entire course of 800 miles are places of pilgrimage, and it is considered an act of great devotion to walk from the mouth to the source of the stream and back again on the opposite bank. This journey takes from one to two years to complete. The Nerbudda rises in the Maikal Range, in the northern section of the Central Provinces, and empties into the Gulf of Cambay through an estuary which begins 200 miles north of Bombay, at Broach. Its general direction is westerly, and in the upper half of its course it makes its way over many falls and rapids. On the lower stream large vessels can sail eighty-two miles from the mouth, in the rainy season, and when the tides are favorable seagoing ships can ascend the estuary as far as Broach, thirty miles from the sea.

NEREIDS, *ne're idz,* according to Greek mythology, were the fifty daughters of Nereus and Doris. The Nereids were beautiful and friendly sea nymphs, attendants of Neptune and Poseidon, the former of whom had a Nereid wife, Amphitrite. They were sometimes represented as half human, half fish, but at other times they were pictured as wholly human, riding on sea horses or other monsters of the ocean. Thetis, mother of Achilles, was one of the few well-known Nereids. See NEREUS.

NEREUS, *ne're us,* in Greek mythology, a minor deity of the sea. He was famous only as father of the fifty Nereids, and was often called *the old man of the sea.* He alone knew the way to the Garden of the Hesperides, and one of Hercules' twelve tasks was to seize the golden apples of the Hesperides. In Hercules' hands, Nereus turned from fire to lion, from lion to water, from water to smoke, until, exhausted, he resumed his own shape and directed the victorious Hercules on his journey. See NEREIDS; HERCULES.

NE'RO, LUCIUS DOMITIUS (37-68), for fourteen years an emperor of Rome, and generally regarded as one of the most infamous of men. His father was Cnaeus Domitius Ahenobarbus, his mother the daughter of Germanicus Agrippina, who in A.D. 49 was married to the Emperor Claudius. She at once began to scheme for her son's succession to the throne, in the place of Claudius' son Britannicus, and succeeded in inducing the emperor to adopt him. When Claudius died in A.D. 54 the Praetorian Guard and the Senate united in acclaiming Nero emperor, and he was received with great enthusiasm by the populace. For a time he did nothing to endanger his popularity, for Seneca, his tutor, practically directed the government and skilfully held Nero's passions in check.

NERO
From a bust in the Uffizi Gallery, Florence, Italy.

A Reign of Murder and License. A quarrel with his mother, who had always had great influence over him, led to the murder of Britannicus, whose cause she had threatened to espouse, and Agrippina's death followed in 59; she was killed by her son's orders. From that time on he behaved like an animal that has tasted blood. The slightest suspicion, however ungrounded, against anyone was the sure forerunner of speedy death. There were, of course, conspiracies against the emperor, and among those who were put to death after the discovery of one of these was Seneca, against whom no proof was ever advanced. The emperor plunged, also, into every kind of vice and profligacy, and yet he demanded the adulation of his people for his achievements as poet, athlete, musician and philosopher. He journeyed through Greece, taking part in all the public games and contests, and granted privileges to the province because of the way in which his vanity was flattered.

Rome Burned and Rebuilt. In A.D. 61 occurred the insurrection in Britain under the famous Boadicea, and in 64 the great fire took place in Rome. For six days the conflagration raged, and two-thirds of the city was destroyed; because Nero showed himself unmoved by the disaster, playing upon his fiddle and reciting verses about the burning of Troy while he gazed at the blazing city, he was very generally accused of having been the incendiary. There is no positive evidence that this was true, but he feared the wrath of the people and laid the blame upon the Christians, who were persecuted in all parts of the empire. He rebuilt the city on a far more magnificent scale than before, constructing for himself a wonderful home called the Golden House, in which his orgies took place.

In the year 68 the legions in Spain revolted, declaring their leader, Galba, emperor, and the insurrection spread to the Praetorian Guard. Nero fled, but was overtaken, and committed suicide. The detestation of him had been so great that his name was erased from records and monuments, his palace was torn down and his statues were broken; but despite all this, and partly because of it, no one of the emperors was more generally remembered.

Consult Henderson's *Life and Principate of the Emperor Nero;* Abbott's *History of Nero.*

NER'VA, MARCUS COCCEIUS (39-98), the thirteenth Roman emperor, the successor of Domitian. He served as consul in the reign of Titus and Vespasian, and in 96, on the death of Domitian, was elected emperor by the Senate. His predecessor had left many abuses which needed reforming, and Nerva proved both wise and beneficent, lessening taxes, placing justice within the reach of all, and recalling exiles. Fearing the strength of the Praetorian Guard, he associated with him in the rule Trajan, commander of the legions in Germany, who succeeded him. Nerva was deified by the Senate after his death.

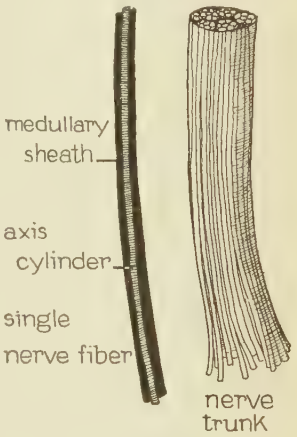
NERVES, *nurvz,* the organs of the nervous system which carry impulses from the brain and other nerve centers to all parts of the body, and from various parts of the body to the nerve centers. Nerves conveying impulses to the nerve centers are called *sensory* or *afferent* nerves, and those conveying impulses from the centers to various parts of the body, *motor* or *efferent* nerves. See NERVOUS SYSTEM, subhead *Nerves.*

NERVOUS, *ner'vus,* SYSTEM. If your hand touches a hot object you instantly withdraw it. If the point of the finest needle pricks through the skin you sense the pain and locate the injury. If a friend calls to you from across the street you respond. When you run your heart beats faster, and you breathe more quickly and deeply. Under all conditions your body adapts itself to its surroundings, and the organism which enables it to do this is the nervous system. In the lower animals the nervous system is very simple and incomplete, but as we pass from these to the higher forms of animal life we find the nervous system becoming more and more complex, until in man it reaches its highest development.

The nervous system consists of the brain and the nerves. It is often likened to a great telephone system. The brain corresponds to the central exchange, the nerves to the connecting wires and the networks of nerves or ganglions to the local exchanges. The nerves carry impressions (messages) from all parts of the body to the brain, and the brain sends impulses (commands) to all parts of the body; hence this comparison gives a very good idea of how our nervous system acts, with this exception—the telephone system must be set in action by some outside force, while the brain has the power to impel the nerves to action because it is the seat of the mind.

The nervous system is generally divided into the cerebrospinal and the sympathetic systems. The description of these will be better understood if we first learn something about the structure of nerve tissue.

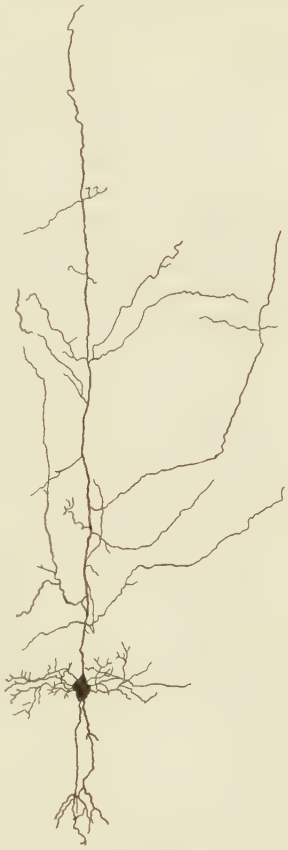
Structure of Nerve Tissue. Examination of nerve tissue under a powerful microscope shows it to consist of cells having a peculiar form. They consist of a central portion or mass and long, threadlike branches whose ends resemble that of a string that has been frayed out. These cells, to which the name *neurone* is given, compose the nerve matter of the system, so that "the nervous system equals the sum of its neurones." Some of the branches of the neurones extend to remote parts of the body, but most of them are short. The branches of different cells meet and connect cell with cell and nerve with nerve. There are millions of these cells in the brain, and they extend through it in all directions, uniting each center with its respective nerves and one center with another.



A NERVE
Very highly magnified.

Nerves. Dissection of any animal reveals numerous white cords extending through the muscles. These are nerves, or nerve trunks. Each nerve consists of a central axis composed of neurones, and enclosed in a sheath of white fibrous tissue. A nerve trunk consists of a bundle of nerves and may be compared in its structure to a bundle of wires, each wire insulated by being wound with thread. However, the white fibers in the nerve run lengthwise instead of being wound round the axis, as they

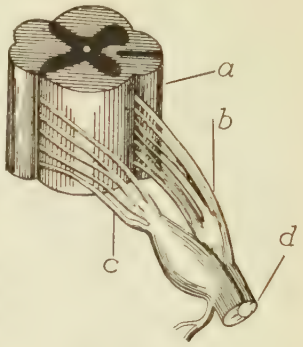
are in case of the wire. The nerves divide and subdivide as they extend from the main nerve trunk until they form a complete network under the skin, so closely woven that you cannot prick it anywhere without injuring one or more of the nerves. The frayed-out ends of the neurones take different forms for different purposes. Those connected with the sense of touch, for instance, take one form, and those connected with the sense of sight another, so that each set of nerves is especially adapted to its peculiar function. Nerves, like the brain, consist of gray and white matter, the gray matter forming the axis and the white the sheath. There are two classes of neurones, those carrying impulses to the brain and those carrying impulses from the brain, and neither set can perform the function of the other. The nerves formed from neurones of the first class are called *sensory* nerves and those formed from the second class, *motor* nerves.



A NEURONE
From the optic nerve; very greatly magnified.

Cerebrospinal System. The cerebrospinal system comprises the brain, the spinal cord and the nerves branching off from them. It presides over voluntary motion, is the seat of the sense of touch and other senses connected with the muscles, and through one pair of the cranial nerves connects with the sympathetic system, which, in a measure, it controls.

Spinal Cord. The spinal cord is the largest nerve trunk in the body. It extends from the medulla oblongata through the cavity in the spinal column to the lumbar vertebrae. It is divided by folds into right and left halves, and each half has three columns slightly marked by folds. At its lower extremity it divides into a number of nerve trunks, some of which continue downward in the spinal column to the sacrum; others extend to the lower limbs. In the lower part of the neck there are also enlargements from which nerves branch off to the arms. The spinal cord is composed of gray and white nerve tissue. The gray matter is enclosed in the white, and a cross section of it somewhat resembles the letter *H*. In the center of the cord there is a canal which, at its upper end, connects with the ventricles of the brain.



SPINAL CORD
A section of the spinal cord (*a*), showing sensory nerve (*b*), motor nerve (*c*), and nerve trunk (*d*).

Spinal Nerves. Thirty-one pairs of nerves branch off from the spinal cord and extend to all parts of the surface of the body below the head and neck. Each nerve trunk contains sensory and motor nerves, the sensory branching from the posterior and the motor from the anterior side of the cord. Soon after leaving the openings between the vertebrae these nerves unite and form a small network or ganglion, as shown in the illustration.

Physiology of the Cerebrospinal System. The nerves of the cerebrospinal system work in pairs, the sensory nerves conveying impulses to the brain and the motor nerves conveying impulses from the brain. You say, "John, please close the door." Your words are carried to the auditory centers of the brain through the nerves of hearing, and the brain sends to the necessary muscles the impulse to perform the act. You hand me a book and ask me to read to you. The forms of the words on the printed page are conveyed to the brain through the nerves of sight, and the brain sends impulses through certain motor nerves that cause me to utter the words aloud. You can recall hundreds of illustrations of this sort of nerve action.

Sometimes, as in case of injury or fright, the motor impulse is sent over the nerves before the sensory impulse has reached the brain, the communication of one set of nerves with the

other being made through a minor nerve center. This is explained under Reflex Action (which see).

Cranial Nerves. Twelve pairs of nerves branch off directly from the brain and reach the muscles and other organs through openings in the skull. The following pairs are of interest to the general reader: The first pair are the nerves of smell *(olfactory);* the second, the nerves of sight *(optic),* and the third, the nerves which control the movements of the eye and the contracting of the iris to accommodate the pupil to the intensity of light. These are the *motor nerves of the eye.* One branch of these nerves controls the movements of the upper eyelid. The eighth pair are the nerves of hearing *(auditory),* and the ninth, the nerves of taste *(glosso-pharyngeal).* The tenth pair are often called the *pneumogastric nerves.* They are distributed to the pharynx, windpipe, lungs, heart, stomach and other vital organs, thus forming the connection between the sympathetic and the cerebrospinal systems. It is through the action of these nerves that mental states affect the vital organs. Fear, for instance, lessens the number of heart beats, and melancholy influences digestion. The nerves of the twelfth pair *(hypoglossal)* are distributed to the tongue and control the movements of that organ.

Sympathetic System. The nerves of the sympathetic system extend to the heart, lungs, stomach, intestines and other vital organs, whose action they control. These nerves branch off from the spinal nerves not far from the spinal column and enter a row of ganglia on each side of it. Each ganglion is connected with the one above and the one below it. After leaving the ganglia the nerves form many large and intricate networks called *plexuses.* The largest, the *solar plexus,* lies just back of the stomach. A blow on the stomach may paralyze the nerves of this plexus and cause death. The nerves of this system so bind together the vital organs that any injury or disease affecting one organ affects all. Because these organs seem to sympathize with each other the term sympathetic was applied to this system, but it has little significance. These nerves act more slowly than those of the spinal system. Injury to a spinal nerve is instantly known, but pains caused by indigestion may not be felt until several hours after the meal is eaten.

Hygiene. The brain and nerves are the most delicate body structures. They are the most easily injured and the most difficult to restore to a state of health. The first requisite to the health of the nervous system is an ample supply of pure blood. One-fifth of the blood goes to the brain and proportionate quantities are required for the nourishment of the nerves, consequently one who desires to maintain his nerves in a normal condition should eat plain, nutritious food and take plenty of exercise in the open air.

Overwork, either physical or mental, subjects the nerves to an unnatural strain and should be avoided (see Fatigue). Sleep is one of the best restorers of nervous energy. Stimulants, narcotics and drugs are injurious and should not be used except under the direction of a physician. W.F.R.

Related Subjects. The following articles are closely related to this subject, and reading them will add interest to it:

Blood	Health Habits
Brain	Narcotic
Breath and Breathing	Reflex Action
Ear	Senses, Special
Education, subtitle	Sleep
Hygiene of Education	Taste
Eye	

NEST. See Bird, subtitle *Nests of the Birds.*

NES'TOR, a Greek hero, the son of Neleus and Chloris, king and queen of Pylos in Messenia. While he was away on a visit to Gerenia, Hercules killed his father and brother, because Neleus refused to purify him after the murder of Iphitus (see Hercules). Nestor escaped only because he was away. He became a great warrior and took part in the battle between the Centaurs and the Lapithae. According to some writers he was one of the huntsmen who helped slay the great Calydonian boar, and a member of the Argonautic expedition (see Argonauts). During the Trojan War, although he was an old man and could not fight, he was one of the wisest of the Greek council; this tradition of his wisdom has been preserved in the figurative use of the name *Nestor* as a synonym for one who is very farseeing and prudent.

NET, the name of a fabric with an open weave, made of the various threads used in textiles, from the finest silk to the coarsest hemp. The spaces between the threads are called the meshes, and the threads are knotted at the intersections, to keep the meshes a uniform size. Net fabrics are used for numerous purposes. They are made into nets for catching fish, animals and insects, they serve for hammocks, screens and various domestic purposes, and for the daintiest of women's apparel. Wire netting is used to fence poultry yards.

The principal kinds employed for fishing are the *seine,* the *drift* and *trawl,* the *kettle* or *weir,* and the *trammel* nets. The *seine* is very long in proportion to its width, and has a line of corks along one of its long ends and a line of leaden weights on the other, so that it becomes a perpendicular sheet when thrown into the water. It is used near the shore. The *drift* net has the same proportions of length and breadth, but is not loaded with lead, and floats in the water. The *trawl* is a huge pocket, and is dragged along the bottom by the motion of the boat. *Kettle* or *weir* nets, structures fixed on stakes, are placed along the coast between high and low water. *Trammel* or *set* nets are also fixed between stakes, but act like drift nets. Nets were originally woven by hand, but are now made on looms. According to Norse mythology, fishing nets were invented by Loki. See ANGLING.

NETHERLANDS, THE, or **HOLLAND,** one of the most important small countries in the world. Though its area of 12,648 square miles is smaller than that of any European nation except Belgium or Montenegro, and its population of 6,841,155 in 1921 is only a fraction of that in many other countries, it has a foreign trade exceeded in all the world by only Great Britain, Germany and the United States, and rules an empire of nearly 60,000,000 people, the third largest on earth. The country is about the size of Maryland, and not half that of New Brunswick.

People. The inhabitants of this little nation call themselves *Nederlanders,* for the word *Dutch,* by which we know them, is merely a corruption of *Deutsch,* meaning German. Though they have had their distinctive characteristics for centuries, most of them are rather like Germans, but the people of Limburg, the province which juts out to the south near the Belgian city of Liége, are akin to their neighbors of Belgium. Dutch folk are known the world over for the quaintness of their costumes, the wooden shoes of the farmers, their baggy trousers or breeches, and the neat little caps worn by the women of some provinces. Dutch housewives, too, are noted for their fondness for scrubbing. The whole nation is thrifty, and, except the Limburgers, inclined to seriousness. There are half a million bicycles in the country, but fewer motorcycles and automobiles than in any large city of America. Football, gymnastics and skating—and of course moving pictures—are popular, and there are municipally owned theaters. Though close bargainers and very cautious in business, the Netherlanders are renowned for their good faith, honesty, modesty and frankness.

Before 1815 Holland was purely a Protestant state, but the provinces of Limburg and Brabant, and part of Guelderland, all added to the kingdom in that year, are solidly Roman Catholic. The Protestants still constitute nearly two-thirds of the people, and over half of them are members of the Dutch Reformed Church. There are over 100,000 Jews, who have been permitted freedom of worship only since 1847.

Education. Going to school in Holland is a serious business. Even in the universities there are few of the games and sports which brighten school days in America. About three-fifths of the boys and girls go to the public schools; the rest, most of whom are in Roman Catholic provinces, attend private schools. These, too, are under the supervision of the government; all the teachers must pass government examinations, and twice a year, at unexpected times, inspectors appear to examine the pupils in all their studies and discover if the teachers are doing good work. Children between the ages of seven and fourteen are obliged by law to attend school. After finishing the primary grades they have their choice of several courses. There are industrial schools, of which all the carpenters and blacksmiths are graduates. Then there are the *professional* schools, the *burgher* schools and the *gymnasia,* all somewhat like American high schools. Of the five universities,

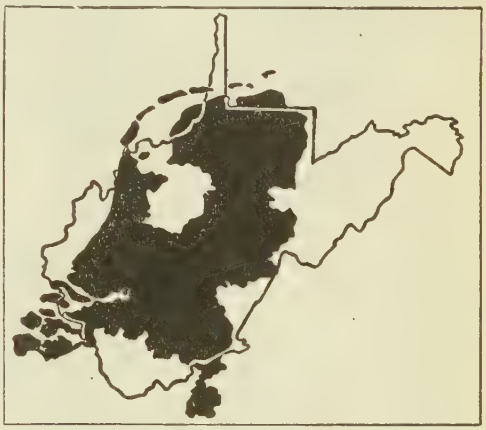
four—Leyden, Utrecht, Groningen and Amsterdam—were established in the Middle Ages. There is also a state agricultural school, which teaches forestry as well as farming.

Language and Culture. Most of the Netherlanders speak the tongue we know as Dutch, which is a near relative of *Plattdeutsch,* or Low German. Flemish, the language of Limburg and Brabant, is not very different. Each province in the whole land is said to have a distinct accent or dialect. Many of the Dutch words bear a close resemblance to those of our own tongue, and a traveler in the country who knows both English and German has little difficulty in understanding the signs on shops or wagons. One striking peculiarity of Dutch spelling appears in the word *ijs,* which is the exact equivalent in meaning and sound of the German *eis* and the English *ice.*

Dutch literature is little known outside its native land, and educated Netherlanders read many books in English, French and German. Erasmus the scholar, Spinoza the philosopher and Grotius, or de Groot, the father of international law, were among the world's greatest men, but like all men of their time, they wrote in Latin. Among the leading writers in the Dutch language are Joost van den Vondel (1587-1679), a dramatist; Jakob Çats (1577-1660), and Willem Bilderdijk (1756-1831), poets; Hendrik Tollem (1780-1856), who wrote lyrical romances; Jakob van Lennep (1802-1868), the Walter Scott of his country; Nikolaas Beets (1814-1903), author of descriptive sketches of his people; Louis Couperus (born 1863), a novelist; and Petrus J. Blok (born 1855), the first Dutchman to write a standard history of his own land.

National fame in music and in art have not accompanied each other in Holland, as they do in most countries. Though to-day Amsterdam has, under Mengelberg, one of the best known philharmonic orchestras in Europe, the Dutch are not a musical people, and have produced no composers. But the Netherlands has given the world some of its greatest painters—Rembrandt, Frans Hals, Jan Steen, van der Meer or Vermeer of Delft and many others (for more about the art of Holland, see PAINTING). In another field of art the nation to-day possesses one who is considered by many to be without an equal—Louis Raemakers, the cartoonist whose stirring pictorial interpretations of events in the War of the Nations created new standards for journalistic drawing.

LOCATION MAP



COMPARATIVE AREAS

The Netherlands is one of the smallest and one of the best governed countries in the world. Its area is only 12,648 square miles, and is therefore only about half that of the small American state of West Virginia. The province of Quebec, in the Dominion of Canada, is more than fifty times as large.

The Country. No name in all geography is better suited to its purpose than Netherlands, for it exactly describes the country which bears it. Holland, too, is appropriate, if, as many think, it originally meant Hollow-land. Part of the little kingdom is below the sea, which is kept back by the famous dikes (dijken), and the mean level of the whole country is only about thirty feet higher. But for Limburg, in which the land rises in one place to a height of over 1,000 feet, the mean level would be even lower than it is.

Napoleon once called the Netherlands the alluvium of French rivers. Three great streams, the Rhine, the Meuse (here called Maas) and the Scheldt, have built up a large part of the kingdom. Other parts have been reclaimed

from the ocean, especially on the shores of the Zuider Zee, the great indentation in the north coast formed on the site of an ancient lake by the sea floods of the twelfth and thirteenth centuries. As is always the case in delta lands,

COSTUMES IN THE NETHERLANDS
For over three hundred years the styles of dress, for both men and women, have remained unchanged.

there are many islands along the coast; the province of Zeeland (Sea-land), at the southwest corner, is almost entirely made up of them. Sand dunes protect most of the shores, and between them are built the dikes, huge barriers of earth and stone. There are lakes, marshes and bogs everywhere in the kingdom.

Farming. Dutch agriculture is known to outsiders principally for cheeses, and Dutch horticulture for hyacinths and tulips. Three-fourths of Holland is farmed, and almost exactly half this amount is in meadow and pasture. In the summer many of the cows are kept in *polders,* drained enclosures sometimes forty feet below the sea, which are pumped constantly by windmills. On the edges of the polders are set posts, so that the storks may be attracted to build nests, for these strange birds keep away the frogs and toads. In winter each farmer's cattle are removed to a scrupulously clean room which is part of the farmhouse itself. There are two types of Dutch cheese; that known best in America comes from Edam, in hard, round balls colored red on the outside. The quantity of cheese made each year is worth about $10,000,000, and, of course, most of it is exported.

If one who has crossed the fields of Illinois, where at times nothing but corn is visible in any direction, or the prairies of Saskatchewan, where wheat is the only thing to be seen, can imagine the place of the grain taken by gorgeous masses of red, blue, yellow, white and purple hyacinths, he will gain some idea of the spectacle that may be witnessed in April by the train traveler between Amsterdam and The Hague. Here, in a space of perhaps twenty square miles, bulb plants of every sort are raised for export to every part of the world.

The other crops of Holland are much like those in any European country. Garden vegetables are raised for export, and potatoes, sugar beets and grains for home markets. There is little timber in the country.

Other Dutch Occupations. Naturally, since over ninety per cent of the country consists either of glacial or river deposits, mining is practically unknown in Holland; there is, in fact, but one mine in the country, a large government-managed coal mine in Limburg. With so little coal or water power to encourage manufacturing, trade and commerce ranks next to agriculture in the number of people it engages. Besides shipment of farm products to the neighboring countries of Europe, a vast trade is carried on in connection with Java, Sumatra and the other Dutch possessions. Cocoa, coffee, tobacco, sugar, tea, spices and other characteristic products of the Indies are imported in a

TWO METHODS OF TRANSPORTATION

raw state and prepared for export to other countries, and cotton cloth and other needs of the East Indians are manufactured and sent to them. The importance of Rotterdam as a port is increased by its connection with the Rhine;

thousands of tons of goods for Germany, Switzerland and Austria are carried up the river in Dutch boats. The Netherlands has always been virtually a free-trade country.

Two at least of the minor industries of the Netherlands are famous. These are the manufacture of pottery at Delft, and the cutting of diamonds by the Amsterdam Jews. Fishing is important to the villages of the coast; there are oysters and small fish (see SPRAT) in the waters at home, but many of the 25,000 fishermen are busy from May to November in the herring fisheries north of Scotland. It is sometimes said that the invention of the process of curing herrings, in the Middle Ages, was the cause of the rise of the Dutch to greatness, and it is recorded that Emperor Charles V visited the inventor's grave and ordered a monument for him.

Rivers, Canals and Railroads. Although only five nations in the world have in proportion to their area more miles of railroad than Holland, this remarkable little country has an even greater extent of water transportation. There are a little over 2,000 miles of railways, almost the same length of canals and about 3,000 miles of navigable rivers and channels. In the polder regions the canals are often above the level of the fields. Many villages are miniatures of Venice, and even in the larger cities much of the transportation is by boat. More than half the railroads are state owned.

The main stream of the Rhine flows into the River Waal soon after it reaches Holland, and is joined a little farther by the Meuse (or Maas). Rotterdam, which ranks with Antwerp, Hamburg, London and New York in its export and import tonnage, it situated on one of the channels of the Rhine-Maas-Waal, but in recent years the channel mouth has become so blocked with mud that a deep-water canal, finished in 1890, was constructed to the sea, a distance of twenty miles. Amsterdam formerly was entered from the Zuider Zee, but it, too, has been connected with the North Sea by canal.

SCENES IN THE NETHERLANDS

Above, canal and windmills; in center, church at Delfthaven in which the Pilgrims held their last service before returning to England to sail for America; bottom, tree-lined canal at Delft.

Cities. Amsterdam, though not Holland's largest port, is its largest city. Amster-

dam's inhabitants number about 600,000, Rotterdam's less than 500,000, but Rotterdam is growing much the more rapidly. The Hague, the nation's capital and the seat of The Hague Tribunal, has 300,000 people. Its true name is *'s-Gravenhage*. Utrecht is the only other city of over 100,000, but there are twenty-six others with more than 20,000. In Maryland, the American state nearest Holland's size, there is one city about the size of Amsterdam, and only one other over 20,000.

Government. Till the French Revolution Holland was the foremost champion of liberty on the European continent, but having learned under French domination the sordid side of republicanism, the Dutch people decided after the fall of Napoleon to have a king. The constitution of 1814, with amendments, is still in force. Under it Queen Wilhelmina has executive power, and a slight measure of legislative power as well, for acts of the *Staten Generaal,* or Parliament, are submitted to her before being voted on as well as after. In addition she may at any time dissolve either or both sections of the States-General. The upper half of the Parliament, called the *Eerste Kamer,* or First Chamber, corresponds to a Senate. Its members are chosen by the legislature, or *Staten,* of the eleven provinces and serve nine years, one-third of them retiring every three years. The *Tweede Kamer,* or Second Chamber, contains 100 members, twice as many as the First, and they are elected by the people. Since 1916 all men over twenty-three have the right to vote, which before was limited to taxpayers, householders and wage earners.

All national legislation originates in the lower house, the upper chamber lacking even the power to amend the bills sent to it. But with the caution so characteristic of the Dutch, financial matters are kept entirely out of the hands of the States-General, instead of being in the control of the lower house as in most countries. The Minister of Finance prepares an annual budget which he presents to a special commission of seven, appointed for life by the queen.

A Council of State shares with the sovereign the governing power. It is distinct from the Cabinet, which is like those of other European nations in being responsible to the States-General. The Council of State has fourteen members and a vice-president. The sovereign presides, and the heir apparent, when of age, is also a member.

The Cabinet Ministers, who are frequently, though not necessarily, members of the States-General, may attend all sessions of that body and may speak to any question, whether they are members or not. Only the members may

NATIONAL PALACE
The official residence of Queen Wilhelmina.

vote. Usually there are twelve Cabinet members, three without portfolios and nine others presiding over departments of Interior, Foreign Affairs, Finance, Justice, Colonies, Marine, War, Communications, and Agriculture, Industry and Commerce.

The legislatures of the provinces consist each of one chamber. They may legislate in all matters of provincial welfare, but subject to the approval of the queen. Communities have councils and mayors, but they are subject to the legislatures of the provinces, and their ordinances may be vetoed by the queen.

The Empire. Holland's colonial possessions, aside from Surinam or Guiana, and Curaçao, are all in the East Indies. Java is the most important of them, for it contains about 30,000,000 people. In area, however, Borneo, New Guinea, Sumatra and Celebes are larger. Most of the people of the islands are Mohammedan.

The eastern colonies, a list of which will be found in the article East Indies, Dutch, are administered by a Governor-General and a council of five appointed for four years by the queen, who may pass laws except in matters which, according to the constitution, remain in the hands of the legislature at The Hague. The natives are actually governed through a complex system of officials of their own race, who sometimes receive commissions on the amount of taxes they collect. In general the Dutch are very lenient rulers, often criticized by other nations for their laxity in allowing native customs to continue; on the other hand, they systematically force the output of the islands to be kept up to its maximum level. Only in Sumatra and Lombok have they had to wage war to conquer the natives.

OUTLINE AND QUESTIONS ON THE NETHERLANDS

Outline

I. Position and Size

(1) Location relative to other European countries
(2) Area
  (a) Actual
  (b) Comparative

II. Physical Features

(1) A low-lying country
  (a) Average elevation
  (b) Greatest elevation
  (c) The dikes
(2) Of alluvial formation
(3) Rivers
  (a) Rhine
  (b) Meuse
  (d) Scheldt

III. Industries

(1) Agriculture
(2) Dairying
(3) Manufactures
(4) Fishing

IV. Transportation and Commerce

(1) Railroads
(2) Rivers and canals
(3) Important articles of trade

V. The People

(1) National characteristics
(2) Likeness to Germans
(3) Religion
(4) Education
(5) Language
  (a) Dialects
(6) Literature
(7) Painting
  (a) Many great names
(8) Population and cities

VI. Government and History

(1) Powers of ruler
(2) The two legislative chambers
(3) Local government
(4) Colonies
(5) Early history
(6) Feudal system and independence of cities
(7) Center of Liberalism
(8) Conflicts with Spain
(9) Rise to power
(10) Commercial supremacy
(11) Encounters with the French
(12) Napoleonic era
(13) The modern kingdom

Questions

What novel method of checking the advance of a French army did the Dutch people resort to?

How many European countries are smaller than the Netherlands?

What does the word *stadtholder* mean? Who was the most famous stadtholder?

What do the inhabitants of the country call themselves? From what is their English name derived?

What important part did the Dutch play in the history of the United States?

What Dutch document corresponds to the English Magna Charta?

How do you spell a Dutch word that sounds like *ice?*

What famous tribe lived in this region in the time of Caesar?

Name two famous painters of the Netherlands and tell for what they stood.

How long has the country had its present constitution?

What does the name Netherlands mean? Why is it especially appropriate?

What is the real name of the capital of the country? What has attracted special attention to it in recent years?

What is the railway mileage to each hundred square miles of area? How many nations surpass Holland in this respect?

History of the Netherlands

The story of the present kingdom of the Netherlands is bound up with that of Belgium, for during part of their history these two have been united and until 1830 the term *Netherlands* included both countries. The word *Holland*, on the other hand, formerly referred, not to the nation, but only to the two provinces in it which were once the County of Holland.

In Roman times the Netherlands were the home of three tribes, the *Belgae* (of whom Caesar tells us), the *Batavi* and the *Frisii*, whose names survive in *Belgium*, in *Batavia*, the metropolis of Java, and in *Friesland*, one of the Zuider Zee provinces. Before Charlemagne's day most of the tribes had been Christianized, and all formed a part of his empire. In the division which followed, the land east of the Scheldt fell to the middle kingdom, afterwards being alternately under East and West Frankish dominion. Thus it came about that there were three languages in the Netherlands: Walloon French, Dutch, and Flemish, which resembled both.

Under the feudal rule the quarrels between the numerous petty rulers in the Netherlands made it possible for a number of the towns to obtain practical independence. The men of the south were weavers, but those of the north were fishermen, mariners and traders. In the fifteenth century several towns jointly fitted up a fleet, which attacked the Hanseatic League and gained freedom for their commerce. Dutch vessels grew in number and the Dutch merchants became the wealthiest of the world. Their city fleets fought even the king of France. Protestantism had a firm hold a century before Luther, and with the advent of the printing press the Low Countries became a center of liberalism. Thus the Netherlands enjoyed prosperity and comparative independence while the rest of Europe knew little but war, oppression and turmoil, and it was natural that they should become the scene of a mighty struggle for liberty.

In 1477 the Netherlanders forced Mary of Burgundy to sign "The Great Privilege," the Dutch Magna Charta, which left to the sovereign even less power than the queen has to-day. Charles V, ruler of nearly all Europe, was born in the Netherlands and felt an interest in its people, but his heavy taxes caused revolts in Bruges and Ghent. His son Philip II, a thoroughgoing Spaniard, did his best to stamp out Protestantism with the Inquisition, but under the leadership of the great William the Silent the Netherlanders drove out the Spanish garrisons.

Though Spain was at this time ruler of over half the world, and the Netherlands was but a tiny corner of it, the conflict between them—which lasted, with slight intervals, from 1567 to 1648—resulted in Spain's financial ruin and Dutch rise to international power. Hitherto the Dutch had been excluded from the Spanish Indies; now they grew rich in its commerce. France and England, enemies of Spain, gave to the Dutch privileges of trade, and Amsterdam became Europe's greatest commercial city, with a population larger than it had in the middle of the nineteenth century. It was at this period that the Dutch settled New York.

But this very prosperity prevented the political advancement of the nation. The merchants of the province of Holland opposed the military activities of their *stadtholders*, or state guardians, William the Silent and his successors, because they did not want the rival towns of Flanders, and Antwerp with its wonderful harbor, included in the nation and sharing their advantages. The Protestants, too, persecuted their Roman Catholic brethren, who predominated in the Belgian Netherlands. Holland province even undertook to negotiate treaties over the head of the States-General, and it was due to Holland's aggression that in 1648 the United Netherlands signed a treaty of peace with Spain, thus breaking its pledge to its ally, France, and leaving the Belgian Netherlands in Spanish hands. By this treaty the independence of the United Netherlands was recognized, and the River Scheldt was closed to commerce, a step which caused the ruin of Antwerp, Amsterdam's rival.

The year 1650 is usually considered the turning point in Dutch history. Twenty years earlier the office of stadtholder had been made hereditary, but upon the sudden death of William II, who in his two years' rule had thoroughly cowed the merchant politicians of Amsterdam, the governing power fell largely to one Jan De Witt. In his time the Netherlands fought two naval wars with England, provoked largely by the latter's commercial jealousy. The first, against Cromwell's Parliament, began in 1652; the second, against Charles II, in 1665. Though the Dutch carried nearly all the world's trade in their merchant ships, their navy was small, and success and failure alternated.

In 1672 the aggressive Louis XIV of France invaded the Netherlands, and took several towns in rapid succession, for De Witt and his party had disbanded most of the army. But again the House of Orange rescued the nation. Prince William, twenty-one years old, persuaded the people not to heed De Witt's advice of surrender, but to open the dikes and flood the land over which the French must advance. The prince later became King William III of England, and during his reign carried on almost constant war with France.

In the succeeding years Dutch prominence in international affairs declined, and the nation lost some of its colonies and much of its trade. At times the princes of Orange were in power, at other times the burghers. In 1794 came the end of the United Netherlands, for the army of the French revolutionists, advancing when the country was frozen over, took Amsterdam. The Batavian Republic was organized, which in 1805 gave way to Napoleon's rule. During this period, because of their connection with the French, the Dutch lost some of their colonies, including the Cape of Good Hope, to the English, and witnessed the ruin of their trade.

When the present kingdom of the Netherlands was formed at Napoleon's downfall, a prince of Orange became King William I. The Congress of Vienna, in fixing the new boundaries, included the Austrian Netherlands within them and gave Luxemburg to the same ruler; but in 1830 the former territory revolted and became the kingdom of Belgium, while the latter was taken from the House of Orange when Queen Wilhelmina came to the throne in 1890, because its law did not then permit a female ruler.

In the great War of the Nations, which began in 1914, the position of the Netherlands was exceedingly embarrassing. It was a small, comparatively weak nation, with sympathies naturally leaning towards Germany, with whom its trade relations were important. In the first month of the war Belgium was overrun by German armies, and this act served as a hint to Holland that the same fate might await her. The strictest neutrality was enforced, and Holland sought valiantly to protect its self-respect and meet such demands upon it as were possible without incurring the enmity of other warring powers. The blockades instituted by the nations affected the people severely, and several times brought them to the point of actual want for the necessities of life. For details, see WAR OF THE NATIONS. G.E.DE V.

Consult Jungman's *Holland;* Meldrum's *Home Life in Holland;* Van Loon's *Rise of the Dutch Kingdom.*

Related Subjects. The following articles in these volumes will be found helpful by the reader interested in the Netherlands:

CITIES

Amsterdam
Arnhem
Delft
Groningen
Haarlem
Hague, The
Leyden
Rotterdam
Utrecht

HISTORY

Belgium, subhead *History*
Bonaparte, subhead Louis Bonaparte
Charles V
Philip II
Ruyter, Michael A. de
Stadtholder
Tromp, Martin H.
Wilhelmina
William I, Prince of Orange

ISLANDS

See list, with article ISLAND.

LEADING PRODUCTS AND INDUSTRIES

Cheese
Dairying
Hyacinth
Pottery
Tulip

WATERS

Meuse
Rhine
Scheldt
Y, The
Zuider Zee

NETH'ERSOLE, OLGA (1870-), an English actress who won fame through her impersonations in emotional rôles. She was born in London and made her début in that city in 1888. Later she toured Australia, and afterwards made her first appearance in the United States in 1894. In such plays as *Sapho, Carmen, Camille* and *The Second Mrs. Tanqueray* she aroused enthusiasm, and in some of the rôles undertaken she was without a rival. In 1906, under her own management, she presented a repertory of her most successful plays at the Sarah Bernhardt Theater in Paris, and after her return to the United States in 1910 appeared in Maeterlinck's *Mary Magdalene,* in *Sister Beatrice* and in *The Awakening of Helena Ritchie.*

NETTLE, *net''l,* a genus of plants containing about thirty species, most of which are herbs covered with fine, needle-shaped hairs. The hairs contain a bitter, watery juice, which produces a painful wound if it enters the skin. Careless handling of a nettle plant is therefore a foolhardy procedure. Several species are useful to man through the fiber furnished by their stems; this fiber is employed in making cordage, paper, thread and grass cloth. *Nettle beer* is a beverage made from leaves, and nettle tops or young shoots are sometimes eaten as a vegetable. The species are distributed through the

temperate regions in both the Eastern and the Western hemispheres.

NETTLE TREE, a North American tree greatly resembling the common elm, and belonging to the same family. It is also called *hackberry* and *sugar berry,* and is found in Southern Canada, west to Puget Sound, and south to Florida, Tennessee, Missouri, Texas and New Mexico. The nettle tree grows from fifty to 125 feet high, sending up a slender trunk covered with rough, brown or pale-gray bark. It may be distinguished by its branches, which are less drooping and more horizontal than those of the elm, and by its leaves, which are smaller and of a brighter green color. For shade and ornamental purposes the nettle tree is very satisfactory, and should be planted more commonly than it is, because the birds love its sweet berries, which hang on the branches all winter. The wood is coarse grained and not very strong, but is utilized for making fences and inexpensive furniture.

There are several other species of nettle tree, found in Europe, Asia and South Africa, and there is also a smaller species of American hackberry. The latter is found in the Ohio and the Mississippi valleys. The European species is valued for its hard wood, which takes a high polish. Shafts, axletrees, oars, hoops, walking sticks, whipstocks and hayforks are made from various parts of this tree.

NEUCHÂTEL, *nuh sha tel',* a town in Western Switzerland, on the banks of the Lake of Neuchâtel, capital of the canton of that name. It is twenty-five miles west of Bern. Built on a slope rising from the shores of the lake, the place has a charming situation. Among its interesting features are an abbey church dating from the twelfth century, and the old castle of the counts of Neuchâtel, now used as a government building. Many fine public buildings, a university, museums of art and natural history and a well-equipped public library bear witness to the progressiveness of the town. Neuchâtel is a railroad center of considerable importance; the chief industries are watchmaking and the manufacture of jewelry and electrical apparatus. Population in 1920, 23,152.

Lake of Neuchâtel, the third largest lake of Switzerland, and the largest lying wholly within that country, of historic interest as the former location of a group of lake dwellers (see LAKE DWELLINGS). It is situated in the western part of the republic, occupying portions of the cantons of Neuchâtel, Vaud, Fribourg and Bern, and has an area of about ninety-two square miles. On its shores are a number of towns and villages, and several rivers flow into it. The lake is practically an expansion of the River Thièle, which enters it at the southwestern end and flows out again at the northeastern. Neuchâtel, the most important town on its banks, is connected by steamers with Estavayer, a town of historic importance situated on the southeastern shore. There are attractive forests and vine-clad slopes along the lake; in other portions the shore is low and swampy.

NEURALGIA, *nu ral' ji a,* as most commonly used, a term applied to pain in the nerves of the face and head. Neuralgic pains, however, may occur in other parts of the body, as in the hip and thigh (sciatica), or the stomach (gastric neuralgia). Neuralgia differs from neuritis (which see) in that it is a symptom of disease or of unhealthful conditions; neuritis is a disease of the nerves themselves. The chief symptom of neuralgia is pain. In some cases this takes the form of a dull, long-continued ache; and in others there are attacks of limited duration but of almost unbearable severity. Many sufferers find that the pain is more intense at night.

Anaemia (which see) is one of the most frequent causes of the ailment, but facial neuralgia may be the result of unhealthful conditions in the eyes, nose or teeth. In many cases cures have been effected by attention to these parts. Anyone subject to neuralgic attacks should endeavor to improve the general health of the body by rest and careful dieting to build up impoverished blood and weak tissues. "Neuralgia is the prayer of a nerve for healthy blood" is the definition of one physician. Exposure to cold and dampness should also be avoided. Drugs to relieve intense pain are sometimes helpful, but should never be taken except when prescribed by a reliable physician. Neuralgia may be a symptom of several diseases, including gout, rheumatism, diabetes and malaria, and the chief remedy in such cases is treatment of the disorder. S.C.B.

For a special form of facial neuralgia, see TIC DOULOUREUX.

NEURASTHENIA, *nu ras the' ni a,* from two Greek words, *neuron,* meaning *nerve,* and *asthenein,* meaning *weakness,* is a name for general exhaustion of the nervous system. The majority of cases are caused by dissipation, worry, bad habits of eating and, occasionally, by overwork. In most instances the patient is suffering from poisons developed in the system by constipation, infected tonsils, decayed teeth,

etc. The excessive use of tea and coffee is a common cause of neurasthenia. The disorder is so common in the United States that it is sometimes called the *American disease*. The neurasthenic worries continually, is exceedingly self-centered and often suffers from inability to sleep, indigestion and poor circulation. The sufferer is also given to undue depression or excitement and is likely to be overemotional. There is often fear which takes a peculiar form, as fright at being in enclosed places, fear of crowds, fear of being alone or fear of falling; or, at times, continual brooding will affect one special function and the patient will think himself unable to talk, unable to hear, etc. It sometimes develops in overindulged, weak-willed children, and as a result of severe shock. Rest, the abandonment of wasteful habits, such as the use of stimulants of any kind, relief from worry and hygienic living will cure it in its earlier stages, but seriously-developed cases require the services of a specialist.

NEURITIS, *nu ri' tis,* a disease of the nerves which occurs in two forms, *localized* and *multiple*. Localized neuritis may result from exposure to cold or from injury to a nerve, such as pressure from a dislocated joint. Slight attacks may last but a few days, but more severe cases sometimes endure for months or years. Severe pain along the path of the affected nerve is the first symptom, accompanied by tenderness in the muscles through which the nerve is distributed. A long-standing case of localized neuritis will cause numbness and wasting of the muscles, and if the arms and hands are affected the patient becomes almost helpless. Multiple neuritis is sometimes caused by infection from various diseases or by lead and other forms of poisoning, but the most common source of the disorder is excessive use of alcoholic liquors. The symptoms of multiple neuritis include acute pain in the head, back and legs, serious impairment of the power to use the arms and legs, wasting of the muscles and, in case of alcoholic neuritis, delirium and convulsions. All cases require the attention of a reliable physician. S.C.B.

NEUROPTERA, *nu rop' ter a,* from two Greek words meaning *nerve* and *wing,* is an order of insects whose distinguishing characteristics are their netted-veined wings, biting or piercing mouth parts and complete development from the larval to the adult stage (see Metamorphosis). According to modern classification the order is now divided into seven families, which show great variation in structure and habit. Representative of the Neuroptera are the alder fly, fish fly, ant lion and dobson fly. The May fly, stone fly and dragon fly, formerly included in the order, are now considered as forming separate orders. Nearly all members of the order Neuroptera live on the land in immature and adult stages, but the larvae of a few forms are aquatic. See Insect.

NEUROSIS, *nu ro' sis* (plural *neuroses*), a Latin word form from a Greek word, *neuron,* meaning *nerve*. The term is applied to nervous disorders which do not originate in a wound or in a disease which changes the physical structure. Neuroses generally arise from a bad state of mind—a morbid mental condition which reacts on the health of the patient. People of imaginative, oversensitive or hysterical temperament are most apt to develop the malady. Drugs are of no value, except such as may calm the patient. The treatment is entirely mental, performed by appealing to the sufferer's reason, and encouraging him to regain self-control. There is also *occupational neurosis,* such as *writer's cramp,* which is marked by numbness and inability to write. It is brought on by muscle fatigue in persons of nervous temperament.

The term is used in psychology and physiology to denote the neural processes which are believed to be correlated with all mental processes. It is the view to-day that there can be no mental act that is not associated with a nerve process. See Neurotic, below.

NEUROTIC, *nu rot' ik,* from the Greek *neuron,* meaning *nerve,* is a word which originally had the same meaning as *nervous*. However, it now has come to have a more specific significance, being used to describe a person suffering from some nervous disturbance, such as hysteria, or one who is of a highly nervous temperament.

Until recently *neurotic* was used in medicine to designate drugs which affect the brain centers which govern intellect, sensibility and movement. Alcohol, strychnine and opium are examples of neurotic drugs. See Neurosis.

NEUTRALITY, *nu tral' i ti.* When two or more nations engage in war, other nations that decide to take no part in the conflict but to conduct themselves so that they can retain the friendship of the warring powers, are called *neutral* nations. The condition which exists under such circumstances is spoken of as *neutrality*. Neutral nations, however, have certain duties which they must perform if they desire to be regarded as neutral, and they are entitled to certain rights, which must be granted them

by the nations engaged in war. The formulation of these rights and duties constitutes one of the most important divisions of international law, which concerns itself with defining relations between nations.

All duties of neutrals rest upon the principle that no direct military assistance shall be rendered to belligerent nations; it must not allow its territory to become in any way a base of operations against either, as would be the case if the passage of troops across it were permitted. It must not allow ships of the contending powers the protection of its ports, save for a limited time, or to make necessary repairs. However, if soldiers of one belligerent, to escape the enemy, enter the territory of the neutral, they will be granted protection, though they become virtually prisoners of war in charge of the neutral until the close of hostilities.

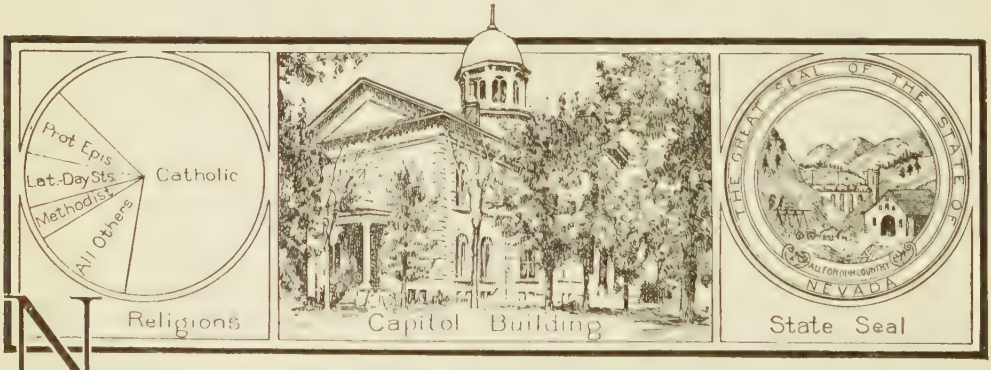
One of the most important rights of a neutral is that of transporting merchandise, even though belonging to one of the warring nations, in ships under its neutral flag, safe from capture by the enemy's ships, provided the goods in passage are not such as would assist warlike operations. But belligerent ships have the right to detain and search neutral vessels suspected of carrying forbidden goods; if such are found, the goods themselves are confiscated, and in some cases, the ship and entire cargo are included. A neutral nation is not bound to prevent the transport of forbidden goods by the ships of its citizens or subjects, but it must acquiesce in the loss that may devolve upon the owners of the ship in case of capture.

That "history repeats itself" is a time-worn adage. Neutrality agreements have been broken since men have first disagreed; the earliest recorded version of an interesting violation is found in the book of *Numbers* (XXI; 21), and is remarkably similar to the experience of Belgium in the War of the Nations, in 1914, nearly 3,400 years later:

> And Israel sent messengers unto Sihon, king of the Amorites, saying,
>
> Let me pass through thy land: we will not turn into the fields, or into the vineyards; we will not drink of the waters of the well: but we will go along by the king's highway until we be past thy borders.
>
> And Sihon would not suffer Israel to pass through his border: but Sihon gathered all his people together, and went out against Israel into the wilderness: and he came to Jahaz, and fought against Israel.
>
> And Israel smote him with the edge of the sword, and possessed his land. . . . . F.ST.A.

Consult Fenwick's *Neutrality Laws of the United States;* Wicker's *Neutralization;* Moore's *American Diplomacy, Its Spirit and Achievement.*

NEVA, *ne'va,* a short river of Northwestern Russia, the outlet of Lake Ladoga and the "finger lakes." It flows westward from the southern end of Lake Ladoga for about forty miles, emptying through a delta into the harbor of Kronstadt, an inlet of the Gulf of Finland. It is on the low, marshy delta of the Neva that Petrograd is built. The stream is very important as a waterway, being the last link in the Ladoga-Volga system connecting the Baltic and Caspian seas. Though it is very wide and deep in most places and has a great volume of water from the lakes, it was found necessary to construct extensive engineering works to make an artificial channel through the shallow waters of the delta. See PETROGRAD.



NEVADA, *ne vah'da,* popularly known as the SAGEBRUSH STATE, and one of the Pacific group, is the most arid and most sparsely-settled state of the American Union. Its name, originally applied to the snow-capped mountains of the Pacific slope, is derived from a Spanish word meaning *snow clad,* and refers to the snowy summits of the state's many mountains. The state lies almost entirely within the Great Basin, between the Sierra Nevada and

Wasatch mountains. Ranking sixth in size among the states of the Union, Nevada has an area of 110,690 square miles, about 3,000 square miles less than that of Arizona and a little less than five times the area of Nova Scotia.

The People. There are fewer inhabitants per square mile in Nevada than in any other state of the Union, the average population being 0.7 per square mile in 1920, as compared to 35.5 for the United States. The inhabitants numbered 81,875 in 1910, and the number of people in 1920 was only 77,407. Of these, 55,627 were native born, 17,850 were whites of foreign birth (chiefly Italian, German, Canadian, English and Irish), 4,907 were Indians, 1,553 were Chinese and Japanese and 346 were negroes. There are eighty-eight cities of the United States having a greater number of inhabitants than this entire state, and it is very much over-represented in Congress. The Indian population consists of Piute, Shoshoni and the remnants of a few other tribes. Reno is the largest city, although its population in 1920 was only 12,016 (Federal census). Goldfield, Tonopah, Carson City, the capital, and Virginia City, all having fewer than 5,000 people, are the other chief towns.

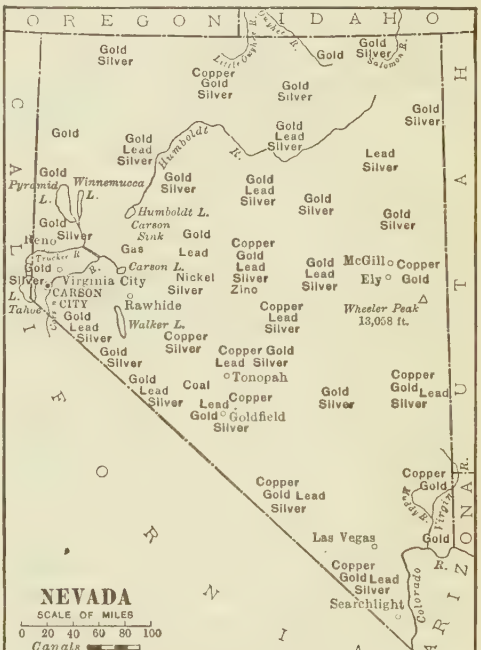
The number of Roman Catholics is more than three times that of all Protestants, the largest denominations of which are the Episcopal, Methodist, Presbyterian and Baptist, ranking in the order named. The Mormons, or Latter-Day Saints, rank next to the Episcopalians in the number of adherents.

Education. Nevada has had to deal with the problem of administering a school system covering an extensive and thinly-populated area. The public schools are well supported by the income from government lands, a special state tax and by local taxation. At the head of the school system is the state superintendent of public instruction, who is elected by the people for a term of four years. A compulsory education law has been passed, but owing to the great distances between towns and settlements, the illiteracy is 6.7 per cent, over three times as great as that in the adjoining state of Idaho. There is a total enrolment of about 12,000 pupils in the elementary schools.

Modern methods have been introduced in the schools. In 1914 manual training was taught in nine elementary and six high schools; instruction in agriculture was given in several high schools, and some industrial art was taught in fifty rural schools. Normal schools at Eureka, Yerington and Tonopah, a mining school at Virginia City and the state university, at Reno, are maintained by the state. The rapid development of Nevada is closely interwoven with the growth of its university, which gives instruction in mining and other branches of technology, and maintains an agricultural experiment station and model stock farms. The university has been richly endowed by Clarence Mackay of New York, whose father made much of his wealth in Nevada gold.

Other state institutions are a hospital for the insane at Reno; an orphans' home and the state prison at Carson City and an industrial school at Elko. In June, 1915, the Nevada School of Industry, a reform school for boys, was opened. Several industrial schools for Indians are maintained by the Federal government. The deaf, blind and feeble-minded are cared for at the state's expense in institutions in California.

The Land. Nevada is an arid table-land, 2,000 to 6,000 feet above the sea, broken by numerous mountain ranges rising to elevations



OUTLINE MAP OF NEVADA

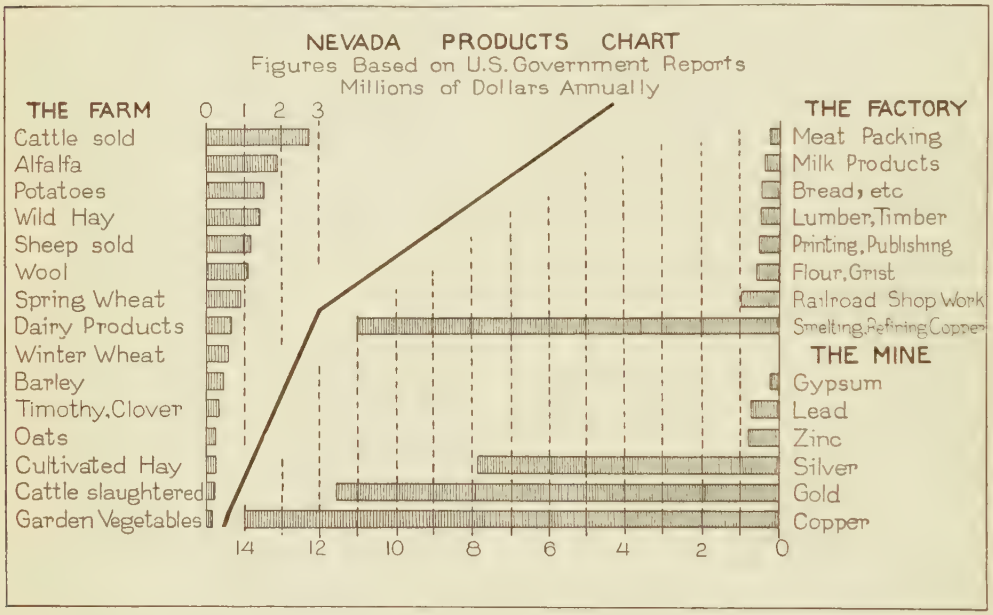
Showing boundaries, chief rivers, principal cities, location of mineral deposits and the highest point of land in the state.

of 7,000 to 10,000 feet, by buttes and mesas, and intersected by a series of long, parallel valleys. The southeast corner is the only part of the state with an elevation of less than 2,000 feet. The lowest point, 700 feet above the sea, is in

the canyon of the Colorado River. The mountains, scarred by torrents and well-worn passes, are covered with only a straggly growth of timber. Humboldt Range, near Utah, is the most lofty and rugged, and one of its peaks, Mount Wheeler, with an elevation of 13,058 feet, is the highest mountain of the state. Although no sections except the "alkali flats," which are great mud beds covered with dazzling white salt, are devoid of vegetation, there are no green or flowered fields except where irrigation is practiced, and the valleys are covered with the dull, dusty sagebrush, greasewood and creosote bushes.

The lakes have no outlets, and their brackish waters contain one-tenth as much salt as the water of the sea. Pyramid Lake, thirty-one miles long, seven to eleven miles in width and of great depth, is the largest body of water in the State. Lake Tahoe, on the California boundary, 6,225 feet above the sea, its waters deep and clear, is one of the most beautiful lakes in America, and is visited by many tourists.

Climate. The climate of Nevada is mild and excessively dry. The winds are strong, but the skies are usually cloudless. The high altitude causes a large daily range in temperature; even



Rivers and Lakes. Few of Nevada's streams find an outlet to the sea, but the Owyhee, draining the northeast corner of the state, flows into Snake River, and the extreme southeast corner is drained by the Colorado. Over a great part of the state streams flowing only during the wet season empty into wide, shallow swamps or "sinks," from which the water evaporates during the summer months, leaving hard mud flats. In the north, the mountain snows make the streams more permanent. The Humboldt, Nevada's largest river, flows across the state in a crooked channel for 375 miles and empties into Humboldt and Carson sinks. Walker, Carson and Truckee rivers are other important streams, and their waters are diverted for irrigation purposes (see subhead *Irrigation,* page 4135).

in the hottest weather, the nights are cool. The lofty Sierra Nevada Range protects the state from violent western storms; the winters are mild, the temperature usually rising above freezing during the day. The average annual temperature of the state is 49.6° F. The rainfall is chiefly during the winter months and is greatest on the mountains, though it varies widely at different elevations. Except on the mountain summits, snow lies on the ground but a few days each year. There are long seasons of drought when water is most needed for agricultural purposes, and the annual rainfall averages but ten inches a year. However, the invigorating dry air, sunshine and mild winters make the climate healthful and pleasant.

Agriculture. In Nevada agriculture depends upon irrigation, and in 1910 the improved land

in farms covered only 752,117 acres, the average farm being 1,009 acres in size. Ranches containing from 50,000 to 100,000 acres of arid land are devoted to grazing, which is the most important branch of the agricultural industry, and the valleys are sometimes overrun with wild horses. The live stock of the state, as estimated by the United States Bureau of Agriculture, comprises 25,000 milch cows; 472,000 other cattle; 1,532,000 sheep; 77,000 horses; 3,000 mules; 40,000 swine. The income from dairy products is nearly $1,000,000 annually. Lack of transportation is felt.

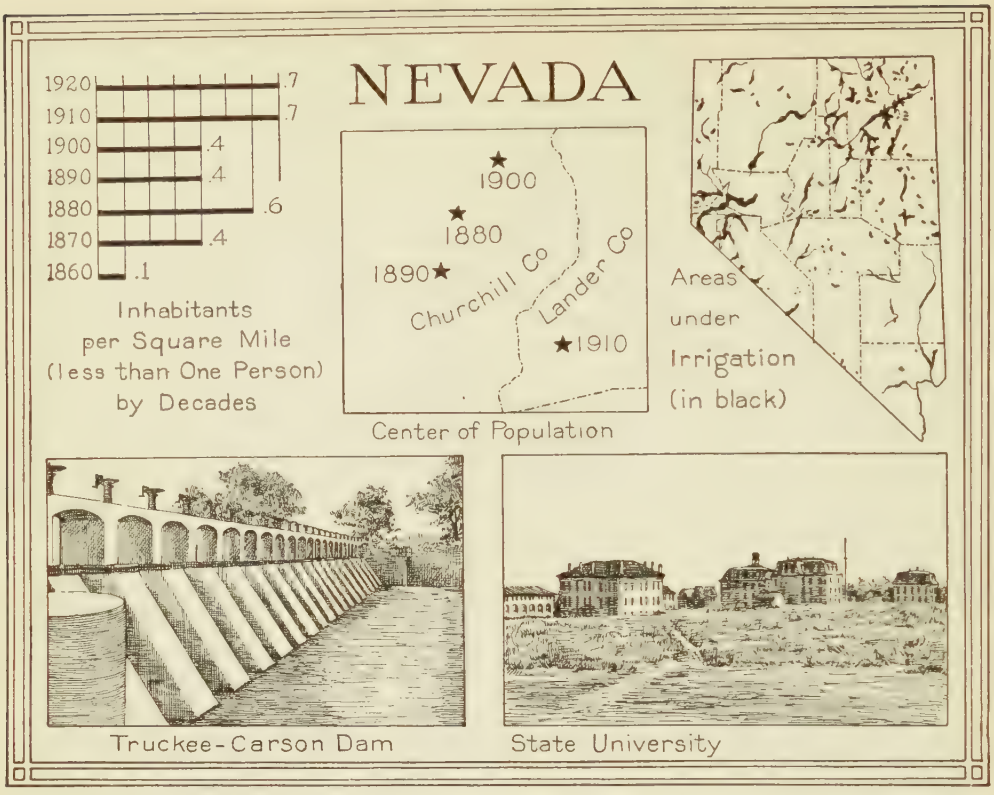
Recent agricultural improvements are doing much to overcome the lizard-hiding sagebrush, and the soil when reclaimed is well adapted to the raising of forage crops, cereals, vegetables and fruits. Although Nevada does not rank high among the states in the total amount of any of these crops, intensive cultivation in the irrigated districts produces a large crop per acre. With an average yield for ten years of over thirty bushels, Nevada ranks first among the states in the production of spring wheat per acre, but only fourteenth in the total amount produced. In winter wheat the yield is twenty-five bushels per acre, exceeded only by five states, all of which practice irrigation, but in total production Nevada's rank is only thirty-eight. Elko is the banner county of the state.

The chief crops are hay and forage, about 800,000 tons; potatoes, 2,000,000 bushels; wheat, 1,500,000 bushels; oats, 650,000 bushels; barley, 600,000 bushels. The production of hay and forage increased fifty per cent between 1909 and 1919, and the output of potatoes in 1919 was nearly three times the crop of the first year named. In both irrigated and unirrigated sections apples and other orchard fruits, grapes, raspberries, loganberries, gooseberries, strawberries and currants are cultivated. In 1907 and 1908 a plague of Carson field mice greatly damaged the crops; the state agricultural station is studying methods for preventing and destroying such pests. The public lands are open to settlement free of charge except for payment for drainage and water. Nevada ranks first among the states in the extent of its public lands.

Irrigation. In 1920, 93.3 per cent of the improved land in farms was artificially watered land, and there were in the state 3,151 miles of irrigation ditches. The three principal irrigating districts are along the Humboldt River, in the valleys of the Carson, Truckee and Walker rivers, and at the foot of the mountains along the western border. Near the mouths of desert canyons a few intermittent streams furnish some water for irrigation. In 1902 work was begun by the government on the famous Truckee-Carson systems, to reclaim 200,000 acres of desert land. A canal thirty-one miles long, diverting the Truckee River into the channel of the Carson, was completed in 1905. The total cost of the project is estimated at $9,000,000. Irrigating plants are supplying water at a cost of about $12,188,750. The work is superintended by the State Bureau of Industry, Agriculture and Irrigation.

Minerals. Nevada is above all a metal-producing state. In fact, its existence as a state is chiefly due to the wealth of its deposits of gold and silver. One of the richest mineral belts in the world extends along the California border and beyond the Colorado River into Arizona. The development of Nevada's mines began in 1860, with the discovery of the Comstock Lode, rich in gold and silver. Between 1869 and 1879 the Sutro tunnel, four miles in length, extending through a mountain and into the interior of the mine, was built. This is valuable for scientific as well as commercial purposes. The total product of gold taken from this lode between 1860 and 1890 was valued at $340,000,000. After 1890 the vein was practically exhausted, but in 1900 rich discoveries were made at Tonopah, Goldfield and other places in Esmeralda, Nye and Lincoln counties. Since that date Nevada has been one of the leading states in the production of gold and silver. It ranks fourth among the states in the production of gold, and since 1910 has been first in the output of silver. In 1920 its gold production reached a value of $6,619,937, a decline from the total of past years. Its silver has been above $7,000,000 in value since 1911. Copper, one of the most valuable products of the state, was not important until 1908; in 1920 the value of the copper product was $12,500,000. Lead, zinc, graphite, quicksilver, tungsten, sulphur, salt, iron ore, platinum and mineral waters are also produced. The total value of the mineral products of the state is gradually decreasing.

Manufactures. With the exception of New Mexico and Wyoming, Nevada is the least important of the states in manufacturing. This is due to the predominance of mining interests and to the great distances between its scattered and small cities. There are fewer than 200 manufacturing establishments, employing in all about 4,000 persons. The total value of



manufactured products is more than $16,000,000. The smelting of ores, car repairing and the milling of flour and lumber are the chief industries.

Transportation. Nevada's industrial growth has always been hampered by the lack of transportation facilities. Until 1869, when the transcontinental railroad was completed, the only way of carrying the products of the mines across the desert was by wagon-train. An unsuccessful attempt was made to domesticate the camel for this purpose. The northern part of the state is now traversed by two great continental systems, the Central Pacific line of the Southern Pacific Company, and the Western Pacific, and several lines extend through the southern section, the most important of which are the San Pedro, Los Angeles & Salt Lake and the Las Vegas & Tonopah railroads. In 1918 there were 2,296 miles of railroad within the state. There is practically no water transportation in Nevada.

Government and History

Nevada has had but one state constitution, adopted in 1864. Amendments may be proposed by either the senate or the assembly, and after being passed by a majority in both houses and in those of two succeeding legislatures they are submitted to the people; if approved by a majority of voters they become part of the constitution. The state adopted woman suffrage in 1914, hence all citizens, male and female, over twenty-one years of age, residing in the state six months previous to elections, are entitled to vote. Being "battle-born," that is, coming into the Union during the War of Secession, Nevada has a peculiar law allowing its soldiers and sailors the right to vote; no matter where they are located, they may comply with a formula and mail their votes home.

The *legislative body* consists of a senate and assembly, meeting biennially on the third Monday in January. Senators are elected for four years and members of the assembly for two years. The total number of members in both houses is not to exceed seventy-five, the senate having not less than one-third or more than

one-half of that number. The initiative and referendum are in force.

The *executive power* is vested in the governor, lieutenant-governor, secretary of state, attorney-general, state treasurer, comptroller, inspector of mines and surveyor-general. The governor, secretary of state and attorney-general form the board of state prison commissioners and board of examiners, with power to examine all claims against the state.

The *judiciary* consists of a supreme court having a chief justice and two associate judges elected for six years; nine district courts, each having one judge elected for four years; juvenile courts and justices of the peace.

All public officers are subject to recall by the voters of the district from which they are elected. A corrupt-practices act limits campaign expenses to twenty per cent of one year's salary. There are severe penalties for bribery. A workmen's compensation law, child-labor laws, a pure food and drug act and a law forbidding faro and other gambling have been passed in recent years.

History. The first white man known to have entered the territory was Francisco Garces, a Franciscan friar, who passed through it in 1775 on his way to California. In the early part of the nineteenth century Hudsons Bay traders established posts along the Humboldt River. In 1848, by the Treaty of Guadalupe Hidalgo, which closed the Mexican War, the territory was acquired from Mexico and became a county of California. Mormons settled along the valley of the Carson River, to supply gold seekers on their way to California. In 1850 Utah was organized as a territory, including much of the present state of Nevada up to the Sierra Nevada Range. The inhabitants of Carson valley, in 1853 and 1856, claiming that the government of Utah did not protect them, asked to be annexed to California. In 1858 a provisional government was established at Carson City, but the territory remained a remote wilderness until the discovery of gold in 1859.

With the discovery of the Comstock Lode, not only the history of the state began, but the world's finances and the current politics of the United States were greatly affected. There was wild speculation, and miners flocked to the territory from all directions. In 1861 a new territory was organized, the 116th meridian being its eastern boundary, with Utah and 37° N. latitude its southern limit. The next year the territory was extended to its present boundaries, the eastern limit being near the 114th meridian.

Research Questions on Nevada

(An Outline suitable for Nevada will be found with the article "State.")

How much above freezing is the average annual temperature?

What are the most attractive features of the climate?

How did the miners of this region in the early days try to solve their transportation problems?

Why would you rather drink the water of Wisconsin lakes than that of Nevada lakes?

What causes this condition?

How many states have manufactures less valuable than those of Nevada?

Why are the streams of the northern part of the state more permanent than those of the southern part?

For what are the rivers of this state chiefly valuable?

Which would you rather have, the yearly output of the silver mines or that of the copper mines?

Toward what feature of the divorce laws have attempts at amendment been directed?

How much lower is the lowest point in Nevada than the highest point in Illinois?

Is the loftiest point higher or lower than the loftiest point in Colorado? In Wyoming? In British Columbia?

What is the characteristic vegetation of the unirrigated parts of the state?

What connection does the University of Nevada have with the industries of the state?

Why has the school problem been unusually difficult in Nevada?

How many states have fewer people to the square mile?

How does the density of population compare with that of British Columbia? With that of Canada as a whole?

How many cities in the United States have a greater population than this entire state? How many in Canada? (See article CITY.)

If the populations of Chicago and Nevada were transposed, would the state be more or less densely populated than the United States as a whole?

How many cities in the state have more than 5,000 inhabitants?

What does the state name mean?

What is the popular name?

How many states of the Union are larger?

What control have the voters of a district over the public officers elected by them?

Statehood. The state history of Nevada is largely a history of its mines. In 1863 a convention composed chiefly of miners drew up a constitution, but it was defeated in 1864. The great political crisis of the country, due to the war, made two more Republican votes in the senate desirable, so in March, 1864, Congress passed an enabling act and the state was admitted the following October, bringing into the Union another commonwealth to support the cause against slavery and states rights. The state remained Republican until 1892, when it was carried by the People's party.

The reaction following the exhaustion of the Comstock Lode was succeeded by a greater development, beginning in 1900 with the discovery of new deposits. In 1906 and 1908 strikes among the miners at Goldfield and other places caused so serious a disturbance that United States troops were sent to preserve order. Efforts were made in 1913 to make the divorce law, which is notoriously lax, more stringent, by requiring a year's residence, instead of six months, but in 1915 the new laws were practically repealed. In 1921 a new law provided that the death penalty for condemned men should be by administration of deadly gas.

E.B.P.

Consult Bancroft's *Nevada and Her Resources.*

Related Subjects. The following articles in these volumes may be consulted by the reader:

Carson City	Nevada, University of
Copper	Reno
Gold	Silver
Humboldt River	Virginia City

NEVADA, University of, located at Reno, is the only school of collegiate rank in the state. It had its origin in Federal land grants, and was opened in 1874, existing as a preparatory school for a number of years, at Elko. In 1886 it was moved to Reno and established as the state university. The departments at present are the college of arts and science, the college of education, the college of agriculture, including the schools of agriculture and domestic science, the college of engineering, including the Mackay School of Mines, and the schools of mechanical and civil engineering. The courses in mining engineering are especially strong because of the equipment made possible by gifts from the family of Mackays, and because the rich mining region about Reno offers splendid opportunity for experimental work. Military instruction is given as part of the regular course. There are about fifty members of the faculty and about 700 students.

NEV'IN, Ethelbert (1862-1901), an American composer, born at Vineacre, near Pittsburgh, Pa., who placed music lovers in his debt by *The Rosary,* his most famous composition. He began to attract much attention at the age of ten by his excellent piano playing and became so proficient that when he was twelve years old he was sent to Dresden, Germany, to study the art. In his fifteenth year he returned to Pittsburgh to earn money for further instruction, and before he was eighteen years old had saved enough to study three years with the best teachers in Berlin. In 1887 he settled in Boston and became a well-known teacher and concert player, but in 1893 the charm of Europe, especially Italy, was too strong to be resisted and the next seven years were spent abroad. The influence of Southern Europe is very evident in the dreamy, romantic tone of much of his later music. In 1900 he became a teacher in the music department of Yale University, and was in this work when suddenly stricken with heart-failure. Few composers have excelled him in perfection of melody. His *Narcissus* and *The Rosary* are among the most popular compositions ever written, while his *Day in Venice, Water Sketches* and *'Twas April* have won almost equal public favor.

NEW ALBANY, Ind., the county seat of Floyd County, and a shipping point of importance in the southern section of the state. It is situated on the Ohio River opposite Louisville, Ky., with which it is connected by a long steel bridge. Indianapolis and Chicago are respectively 111 miles and 306 miles northwest. The Baltimore & Ohio Southwestern, the Chicago, Indianapolis & Louisville, the Pittsburgh, Cincinnati, Chicago & Saint Louis, the Louisville & Nashville and the Illinois Central railways enter the city, and steamers connect with Ohio and Mississippi river ports. A branch of the Indiana Traction System operates between New Albany and Indianapolis. In 1920 the population was 22,992 (Federal census); in 1910 it was 20,629. Germans predominate in the foreign element. The area of the city is nearly three square miles.

Two miles above New Albany the Ohio River falls in a series of rapids, there being a drop of about twenty feet in the course of two and one-half miles. A canal provides for low-water navigation, and abundant water power is furnished for manufactories, here represented by automobile and furniture factories, tanneries, veneer and planing mills, and one of the largest rolling mills in Southern Indiana. Enormous

deposits of shale suitable for making tile and brick are found in the vicinity, and the small gardens and farms of the locality produce great quantities of fruits, vegetables, grain, dairy products and poultry.

New Albany has a Federal building, a courthouse, a fine bank building and a Carnegie Library. One of the largest Chautauquas in the United States holds an annual session here. There are three parks, and in the vicinity is a national cemetery. The place was settled in 1813 and was named for Albany, the capital of New York; it was incorporated as a city in 1839. In 1913 the 100th anniversary of the settlement was celebrated.

NEW'ARK, N. J., the largest and most important city in the state and one of the leading manufacturing centers in the United States. It is the county seat of Essex County, and is situated in the northeastern part of the state, about eight miles west of New York City, and on Newark Bay, where it receives the Passaic River. The Central of New Jersey, the Delaware, Lackawanna & Western, the Lehigh Valley and the Pennsylvania railways provide excellent interstate and surburban transportation, which is supplemented by a network of trolley lines and by the rapid transit of the tube line under the Hudson River to New York. Steamboats are engaged in river and coastwise commerce. Many nationalities are represented among its people, who in 1920 numbered 414,216, by the Fourteenth census; in 1910 the population was 347,469.

Newark is the industrial center for many thousands of people who live in the chain of suburbs lying beyond its limits to the north, west and southwest. Glen Ridge, Irvington, Montclair, Bloomfield, Belleville and the "Oranges" are among these, and Harrison, Kearny and East Newark are on the opposite or east bank of the river. They are all connected with Newark by bridge and by trolley or steam railway. For about a mile from the water the city is level; then it rises in terraces which, with the adjoining suburbs, form an attractive residential section. More than 600 acres of public parks are under the control of the Essex County park commission; the city and its environs are noted for fine boulevards and roads.

Buildings and Institutions. Newark has many fine edifices, among which are the buildings of the life and fire insurance companies which have headquarters here, for, in addition to its importance as a manufacturing city, Newark is noted as an insurance center. Its public library, erected at a cost of $1,000,000, is considered one of the handsomest library buildings in the United States. Other noteworthy buildings are the county courthouse, city hall, Federal building, city hospital and the Roman Catholic Cathedral. Many of the older buildings are built of the brown sandstone found in the vicinity. Newark is the see of a Roman Catholic and of a Protestant Episcopal bishop. Besides the public schools and the public library, Newark has the Newark Academy, a

LINCOLN STATUE IN NEWARK

A remarkable fact regarding this appealing statue is that the lap of Lincoln has been worn shiny by children who like to climb upon the knees.

number of Roman Catholic academies and the State Historical Society; in the vicinity is the city home for boys, where manual training is taught.

Interesting features are an old home on the river bank, the walls of which are constructed of the old walls of Cockloft Hall, delightfully described by Washington Irving in *Salmagundi;* the old home of Peter Schuyler, known as *Peterborough;* and monuments to Seth Boyden, a Newark inventor, Philip Kearny, an American military leader, and Frederick T. Frelinghuysen, Secretary of State under President Arthur, all of whom lived in Newark. It was also the birthplace of Aaron Burr, an American statesman, who mortally wounded Alexander Hamilton in a duel in 1804.

Industry and Manufacture. Because of its extensive and varied manufactures, Newark is frequently called the *Birmingham of America.* The leading industry is the smelting and refining of copper; the leather industry, which ranks

next, dates from 1698, when the first tanyard was established here, although shoes were made in Newark as early as 1680. In this city, in 1819, Seth Boyden made the first patent leather manufactured in the United States, and in 1828 he discovered the process for making malleable iron. Other important manufactures are jewelry, which has been made here since 1801, foundry and machine shop products, cut glass, hats, thread, campaign buttons, paints and varnish. Slaughtering and meat packing are other important industries.

History. A small company of Puritans from Milford, Conn., made the first settlement here in 1666, when the place was called Milford. Its present name was chosen in 1667, in honor of the first pastor, Abraham Pierson, whose home was in Newark-on-Trent. The town was incorporated in 1693. Newark was the seat of the College of New Jersey (now Princeton University) from 1748 until 1756, when it was removed to Princeton. In 1776 Washington had his headquarters here. In 1836 the city charter was granted and in the same year Newark suffered heavy loss by fire, which was followed by a business panic in 1837. The township of Orange was set off in 1806 and that of Bloomfield in 1812. Vailsburg was annexed in 1905.

NEWARK, Ohio, the county seat of Licking County, situated east of the center of the state, and thirty-three miles east and north of Columbus, the state capital. It is on the Licking River and the Ohio Canal, on the Baltimore & Ohio and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads, and on electric interurban lines. The population, which was 25,404 in 1910, had increased to 26,718 in 1920, a gain of five per cent. The area of the city is about five square miles.

Newark is situated in a broad valley, surrounded on three sides by low hills. It is the site of ancient earthworks of the mound builders, including a large circular embankment and remains of fortifications. The prominent features of the city are the courthouse, public library, Y. M. C. A. building, well-equipped county fair grounds, Buckeye Lake and Mound-builders Park. An appropriation of $190,000 has been made (1916) for the new Federal building. At Granville, six miles distant, is Dennison College. Newark has important industrial establishments, including shops of the Baltimore & Ohio Railroad, engine and machine works and large manufactories of stoves, rope, glassware, electric cars, golf sticks, farming implements, chemicals, cigars and shoes. Newark, named after Newark, N. J., was settled in 1801 and was incorporated as a city in 1826.

NEW BEDFORD, Mass., a city famous for its manufacture of cotton goods, ranking first in the United States in the production of fine cotton yarn. It is a port of entry and one of the county seats of Bristol County, and is situated on the southern coast of the state on the Acushnet River, which below the city widens into a harbor that enters into Buzzard's Bay. The New York, New Haven & Hartford Railway and electric lines connect New Bedford with Fall River, Taunton and Boston; the last-named city is fifty-six miles north. Fairhaven, on the opposite side of the harbor, is connected with New Bedford by three bridges, one of which was constructed at a cost of $1,500,000. Steamboats provide transportation for passengers to Marthas Vineyard, Nantucket and Woods Hole, and between New York City and New Bedford there is freight steamer service throughout the year and passenger service during the summer. The entrance to the harbor is defended by Fort Rodman, on Clark's Point. The population in 1910 was 96,652; the state census of 1915 gave an estimate of 114,694, and the Federal census of 1920 gave 121,217, a gain of one-fourth in ten years. The area of the city exceeds nineteen square miles.

Commerce and Manufacture. For many years New Bedford was one of the most important whaling ports in the world, but with the discovery of oil in Pennsylvania the whaling industry declined and the city turned its attention to manufacture. Its present rank as a cotton-manufacturing center is equal to its former rank as a whaling port, and its high-grade Wamsutta muslin and fabrics woven of silk and cotton have made it famous. Nearly 42,000 people are employed in its 267 factories (1920). Besides cotton goods, New Bedford makes silverware, cut glass, cordage, leather and machinery and it has paint works, lumber mills and oil manufactories. Manufactured products, coal and fish are the principal articles of commerce. Large sums of money have been expended by the Federal government and by the state in improving the harbor and the shipping facilities.

Buildings and Institutions. New Bedford is an attractive city with good streets, elegant residences and fine buildings, among which are the city hall, post office, the third district courthouse of Bristol County, Masonic Temple, the state armory and some handsome bank

buildings. The city also has a high school, the state textile school, the old Dartmouth Historical Society and one of the finest libraries in the state, containing about 150,000 volumes. One of the greatest collections of books on the whaling industry in the United States may be found in New Bedford.

History. The first settlement was made in 1652, on land purchased from Massasoit, chief of the Wampanoag Indians, and his son Wamsutta, by a company from Plymouth. It was called Bedford, in honor of the family of the Duke of Bedford, and later New Bedford. Until 1787 it was a part of the town of Dartmouth, in 1812 it was incorporated as a town, and in 1849 as a city. New Bedford was the storehouse of captured prizes during the War of Independence; consequently it suffered an attack by an English fleet under General Earl Gray in September, 1778, when seventy ships were burned and the town was almost completely destroyed by fire. Quaker influence has always prevailed here.

NEW'BERN, N. C., an important seaport on the South Atlantic coast, and the county seat of Craven County. It is situated at the head of steamboat navigation on the Neuse River, an inlet of Pamlico Sound, at the point where it receives the waters of the Trent River. Raleigh, the state capital, is about 100 miles northwest and Wilmington is eighty-seven miles southwest. The Norfolk & Southern and the Atlantic Coast Line railways provide transportation, and steamers communicate regularly with New York and other Atlantic seaports. Americans comprise about ninety-five per cent of the population, which in 1910 numbered 9,961; in 1920 it was 12,198.

Newbern has a large, safe harbor, the Neuse River being two miles wide at this point. From the city are shipped out large quantities of grain, cotton, lumber, truck-garden products and naval stores. Industry is represented by over 60 factories (1920), employing nearly 1,600 wage-earners, and capitalized at $5,196,000. The value of the products that year was $5,702,000. There are also railroad shops. The fisheries, too, are important. The most notable buildings are the county courthouse, the Federal buildings, the county jail and a county home.

A company of Swiss and Germans under Baron de Graffenreid settled here in 1710 and called the place New Berne, for the city of Berne in Switzerland. It was incorporated as a city in 1723 and the first Provincial Congress met here on August 25, 1774. During the War of Secession it was a strongly-fortified port of the Confederacy, but it was taken by General Burnside on March 14, 1862.

NEW BRIGHTON, PA., a borough in Beaver County, on Beaver River, two miles above its junction with the Ohio. It is twenty-eight miles northwest of Pittsburgh, with which it is connected by the Pittsburgh & Lake Erie Railway. The near-by coal fields and the river with its abundant power make possible numerous manufactories, and the borough is of increasing importance industrially. Pottery, bricks, wire, nails, twine, bath tubs and brass castings are among the articles manufactured. The population in 1910 was 8,329; in 1916 it was 9,277 (Federal estimate).

NEW BRITAIN, CONN., a manufacturing city of Hartford County, is in the central part of the state, ten miles south and west of Hartford. It is on the New York, New Haven & Hartford Railroad and has interurban electric lines. The population in 1910 was 43,916; in 1915 the state census reported 50,612, of which number forty per cent are foreign born, including Russians, Swedes, Italians, Germans, Hungarians and Irish. The Federal census of 1920 gave the population as 59,316.

New Britain is known as the "Hardware City," from the importance of its chief manufactures, builders', cabinet and harness hardware. Other important manufactures are cutlery and edge tools, hosiery and knit goods, foundry and machine-shop products and stamped ware. The total annual product exceeded $63,600,000 value in 1920. Agriculture and fruit raising are the industries of the surrounding country.

It is the seat of a state normal school, and among the more prominent buildings are the Federal building, which cost $125,000, the city hall, erected at a cost of $300,000, the Swedish Lutheran Church, Saint Mary's Cathedral, public library (formerly the New Britain Institute), and hospital. Walnut Hill and Smalley Park are attractive playgrounds.

New Britain was settled in 1687. It was first a part of the township of Farmington, then a part of the township of Berlin. The township of New Britain was incorporated in 1850; the city chartered in 1871 and the two consolidated as a city in 1906. It was the birthplace of Elihu Burritt, the "learned blacksmith," and was one of the first cities of the United States to build a subway for telegraph, telephone and electric-light wires.

NEW BRUNSWICK, *brunz'wik,* a province of Canada, the largest of the three Maritime Provinces. It has an area of 27,985 square miles, of which only seventy-four square miles are water surface. New Brunswick is 6,557 square miles larger than Nova Scotia, and is nearly twelve times as large as Prince Edward Island. Its area is about the same as the combined areas of New Hampshire, Vermont and Massachusetts.

The boundaries of the province are partly natural and partly artificial. On the south and east, except for the narrow Isthmus of Chignecto, which connects the Nova Scotia peninsula with the mainland, it has water boundaries —the Gulf of Saint Lawrence on the east and the Bay of Fundy on the south. Northumberland Strait, an arm of the gulf, divides Prince Edward Island from New Brunswick. On the north is Quebec, a part of the boundary being formed by the Restigouche River and Chaleur Bay. On the west two rivers, the Saint John and the Saint Croix, form part of the international boundary. There the state of Maine lies between New Brunswick and southeastern Quebec. From north to south the greatest length of the province is 230 miles, and from east to west 190 miles.

LOCATION MAP
Showing the size of New Brunswick as compared with entire British North America.

The People. The population of New Brunswick at the census of 1921 was 387,876. This was an average of 13.8 per square mile, as compared with 22.98 per square mile in the neighboring province of Nova Scotia and 1.93 for the Dominion as a whole. The rural population was 258,920, nearly seventy-two per cent of the total. About sixty-five per cent of the population is of British descent, and about 100,000 people, or thirty per cent, are of French descent. Immigration has practically ceased, except from Great Britain and the United States, and less than ten per cent of the present population was born outside the province.

Physical Features. The most noteworthy physical characteristic of New Brunswick is the network of rivers, lakes and bays in all sections. Practically every spot in the province can be reached by water. The headwaters of the principal rivers are very near each other, and comparatively short portages are required between them. Thus in ancient days the Indians made portages between the upper waters of the St. John, the Miramichi, the Restigouche and other rivers, just as hunters and fishermen do now. Only the lower courses of the rivers are important as transportation routes, but the upper stretches play a large part in lumbering.

The surface of New Brunswick is divided into two parts by a ridge or height of land extending from the southwest to the northeast corner. This height forms the watershed separating the eastern from the western rivers. It nowhere rises to a great altitude, the average being from 1,000 to 1,500 feet, with here and there an occasional "monadnock" rising to 2,000 or 2,500 feet. Mount Carleton, the highest point in the province, has an altitude of 2,630 feet. The eastern coast, along the Gulf of Saint Lawrence, is low and sandy, but on the south, along the shores of the Bay of Fundy, is another bold, rocky ridge. Except for these two

elevated sections, which are extensions of the Appalachian chain in the United States, the surface is a low, rolling plain, cut by many rivers flowing southward or eastward. Nearly the whole of the western half of New Brunswick is drained by the Saint John River.

Animal and Plant Life. The province has always been famous for its hunting. Game of all kinds, both large and small, is plentiful, but is protected by long closed seasons. Large game preserves have been established at the

OUTLINE MAP OF NEW BRUNSWICK

Showing the boundaries, principal rivers, leading cities, coal deposits and the highest point of land.

heads of the Miramichi, Tobique and several other rivers. Moose, caribou and deer are still common, as are wolves, foxes, beavers, martens, skunks, otters, minks, rabbits and squirrels. Geese, ducks, partridges and other game birds are abundant on the lakes and bays, and there are many song birds, including robins, catbirds, orioles, bobolinks, bluebirds and swallows. Hawks, owls and kingfishers are not unusual, and eagles are occasionally seen. The rivers and many small lakes are stocked with salmon, trout, bass and other game fish. The sea fisheries yield principally lobsters, oysters, herring, cod and smelt.

The plant life, like the animal life, is abundant, but includes no species peculiar to New Brunswick. The abundance of game is due in part to the protection of the forests, which still, in spite of fire and the lumberman, cover over half of the province. Black spruce is most widely spread, but is closely pushed by hemlock, cedar, birch, beech, oak and ash. There are many native grasses, flowers and shrubs.

Agriculture. In spite of a few superficial handicaps, agriculture is, and has always been, the leading industry. The prominence of lumbering and the westward trend of population, which have taken so many farmers' sons into the newer provinces, have somewhat obscured the importance of the farm. Yet according to the last census about 46,000 persons, over thirteen per cent of the total population and nearly one-half of the working population, are engaged in agriculture.

The most productive regions in New Brunswick are the alluvial lands along the rivers. The uplands, too, are for the most part fertile, and yield fine crops of hay and oats. Perhaps a quarter of the total area, comprising heath, bogs and swamps, was formerly regarded as waste land, but with proper drainage now produces large crops of hay. Even the "barrens," so called, produce blueberries in abundance, without cultivation.

Hay is the most valuable crop, with an annual average ranging from $7,000,000 to $9,000,000. The potato crop is about 10,000,000 bushels a year, and is worth more than $4,000,000. The average crop of turnips is 3,000,000 bushels, worth about $1,000,000; oats, 6,000,000 bushels, $3,000,000; buckwheat, 1,500,000 bushels, $1,000,000. The value of the field crops naturally varies considerably from year to year, but $20,000,000 is a fair average total.

Hardy fruits, especially apples, are raised extensively in the river valleys, and berries and small fruits are abundant everywhere. These fruits ripen late, and are sold at good prices in the New England markets, where the local supply has already been exhausted. The provincial government maintains about twenty-five model apple orchards in different sections. The raising of live stock, especially sheep and dairy cows, is receiving increasing attention. There are now about 100,000 milch cows and the same number of other cattle, 125,000 sheep, and about 70,000 horses. The production of butter is well over 10,000,000 pounds a year, and of cheese about 1,500,000 pounds.

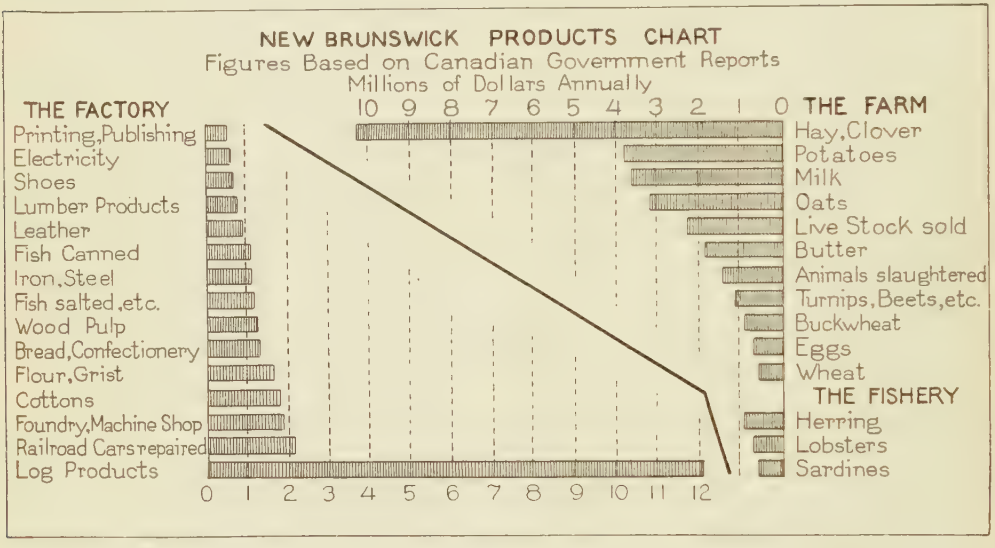
The newest branch of agriculture is fur farming, which has become important in all three of the Maritime Provinces. Although the industry has proved profitable to those engaged in it, it cannot be said that it is as yet firmly established on a sound business basis. The breeding and raising of foxes and other fur-bearing animals, however, is shown beyond doubt to be both practicable and profitable. See Fur and Fur Trade.

Lumbering. When the first settlers came to New Brunswick practically the whole area was covered with forests, but fires and lumbermen have destroyed from one-third to one-half of the forests. On the shores of the Bay of Fundy most of the trees are firs and spruces, varieties which are also found in the western and northern part of the province. In the northeast are birch, beech, maple, ash and other hardwoods, and elm is common in the river valleys. The abundance of trees, the nearness of the forests to the ports, and the facilities for logging furnished by the many rivers have combined to make lumbering second only to agriculture among the great industries of the province. A river without a lumber mill is practically unknown in New Brunswick. The annual timber cut is worth about $7,000,000, and the value of the lumber manufactured is about double that figure. The province controls the cut of timber on crownlands by issuing timber licenses to the highest bidder. The manufacture of wood pulp, though relatively a small branch, is growing steadily, and in time will undoubtedly be a great industry.

Fisheries. The commercial fisheries, with an annual output of $4,000,000, rank third among the industries. The biggest output on record, that for the fiscal year ending March 31, 1915, was $4,737,145. New Brunswick's catch of fish ranks third among the provinces, but it is only one-half the average for Nova Scotia, which ranks second, and about one-third that for British Columbia, which leads. The value of the catch as landed is about two-thirds that of the market value as given above.

The market value of the sardine catch is over $1,000,000 a year, about one-fourth of the total for the province; this total includes the fresh, salted and canned sardines, and about $400,000 of it is properly credited to manufactures. The second valuable catch in the green state is herring, which represents from one-sixth to one-fifth of the total. Lobsters, smelts, cod, salmon, hake and oysters are next in order.

It is estimated that the capital invested in the New Brunswick fisheries is about $4,000,000. Most of it is in the hands of independent fishermen, but in the lobster and herring fisheries there has been a tendency towards combination. The commercial fisheries, with a few insignificant exceptions, are all sea fisheries. Some trout, salmon, shad and other fish are taken from the rivers and inland lakes for commercial purposes, but the total value of this catch never exceeds $40,000 or $50,000.



Mineral Resources. The mineral wealth of New Brunswick is not as great as that of its neighbor, Nova Scotia. Practically the whole of the triangular section lying southeast of a line drawn from Fredericton northeast to Chaleur Bay—a little more than one-third of the entire province—belongs geologically to the Carboniferous Age. Bituminous coal is known to exist throughout most of this section, but for the most part it is impure or in thin seams. The only important coal areas are indicated on the map of New Brunswick on the preceding

page. Of the average annual production of minerals in New Brunswick ($1,000,000), coal represents from fifteen to twenty per cent. A strange coal-like substance called albertite (because it was discovered in Albert County) was formerly of importance, but the only known sources of supply are now exhausted or are too small to be of commercial value. Albertite is jet black, soft and brittle, and burns readily. It is undoubtedly related both to coal and to petroleum. It was formerly used in the manufacture of artificial gas and also of oil.

Of the other minerals which are known to exist the most valuable are iron, nickel, manganese, antimony and salt. Gypsum, plumbago, granite, limestone and brick clay are abundant, and freestone, which is in great demand for grindstones and for building, occurs chiefly in the eastern counties along the Gulf of Saint Lawrence. In 1911 natural gas was discovered near Moncton in Albert County, and this field is now one of the three great sources of supply in Canada.

Trade and Manufactures. One industry, lumbering, is dependent to a large degree on the rivers, but most of the commerce and manufactures are the result of railway expansion. New Brunswick now has about 2,000 miles of railway in operation, and is served by the Intercolonial, the National Transcontinental, the Canadian Pacific and a number of local lines. Its long coast line and excellent harbors have also been strong factors in commercial development. Saint John, the chief port, has all of the foreign trade and a considerable part of the coastwise traffic, but some of the latter is shared by Moncton, Chatham, Dalhousie and other ports. The foreign trade of New Brunswick amounts in round numbers to $50,000,000 a year, of which one-third is imports and two-thirds exports.

The chief article of export, which is also the most important among manufactures, is lumber. Log and lumber products constitute slightly more than one-third of the value of all manufactures—about $15,000,000 out of $40,000,000. Wood pulp is a product of ever-increasing importance, and should continue to increase in value, for the supply of spruce is large, if not inexhaustible. Cotton goods, car repairs, preserved fish, wood pulp, iron and steel products, bread and confectionery rank in the order named. New Brunswick has over 1,200 manufacturing establishments, employing at least 25,000 men, with salaries and wages amounting to $10,000,000 a year.

Government. The government of New Brunswick is like that of the other provinces of the Dominion. The chief executive is the lieutenant-governor, who is appointed by the Governor-General in Council for a five-year term. His salary is $9,000 a year. The lieutenant-governor appoints the executive council or cabinet, which is composed of members of the legislative assembly. As in all the provinces the cabinet or ministry is responsible to the assembly and holds office only so long as it commands the confidence of a majority of the members. The ministry is composed of the premier, provincial secretary and treasurer, attorney-general, and the ministers of agriculture, lands and mines, and public works. In actual practice the premier usually holds one of the other portfolios as well as the presidency of the council. The legislative assembly, composed of forty-seven members, is elected for five years, but it may be dissolved sooner by the lieutenant-governor. There was formerly also an upper house, the legislative council, whose fifteen members were appointed for life, but this was abolished in 1892.

COAT OF ARMS

Local government is carried on by county councils, consisting of two councilors elected biennially by each parish (the county is divided into parishes, as in Quebec, not into townships, as in Ontario). Unlike other provinces there is no well-developed municipal system. Cities may be incorporated by special act of the legislature, and then elect their own mayors and aldermen.

The Courts. There are three classes of courts in the province. The local courts are presided over by police magistrates and justices of the peace, whose jurisdiction is limited to cases involving debts not over $80. The county judges, six in number, appointed by the Dominion government, have jurisdiction in suits for debts or damages up to $400, in actions for tort to $200, and in suits for penalties on sheriff's bonds to any amount. The supreme court is composed of seven judges, appointed by the Governor-General, and each of its members may act as a trial judge. This court has

original jurisdiction in all matters not assigned by law to the special divorce and admiralty courts. The chief justice and two puisne justices sitting together constitute a court of appeal.

Finance. Nearly one-half of the total income of the province comes from the annual subsidy granted by the Dominion government. On the basis of the 1921 census this subsidy amounts to nearly $700,000 a year. Timber licenses are an important source of revenue, and the balance is made up of miscellaneous taxes and fees.

Education. All public schools in New Brunswick are undenominational and free. The schools are under the control of the Board of Education, which is composed of the lieutenant-governor, the members of the executive council or ministry, the chancellor of the University of New Brunswick and the chief superintendent of education, the last appointed by the lieutenant-governor in council. The province grants to each school a sum in proportion to that raised by the school district for the payment of teachers' salaries. The county school fund and local district assessments provide the remainder of the revenue needed.

The provincial normal school (with 400 students) and the provincial university, both at Fredericton, are open to all persons, irrespective of creed. The University of Mount Allison located at Sackville, under Methodist control, was the first college in Canada to grant admission to women on the same conditions as men. At Memramcook is a Roman Catholic college, which ranks among the best in Canada.

History. The history of New Brunswick as a separate colony begins in 1784. Previous to that year it was first a part of Acadia and later of Nova Scotia. The earliest settlement within its borders—that made by Champlain and De Monts in 1604, at the mouth of the Saint Croix River—was soon abandoned, and only traders and adventurers roamed through the wilderness during the French régime. The first English settlement was Maugerville, established in 1762, but the foundation of the province was really laid in 1783, when thousands of United Empire Loyalists emigrated from New England and settled in Canada. So rapidly did the number of immigrants increase that in the next year, 1784, it was organized as a separate colony.

The new colony prospered, and was gradually enlarged by the arrival of immigrants from the British Isles. Although it flourished, New

Research Questions on New Brunswick

(An Outline suitable for New Brunswick will be found with the article "Province.")

How large a proportion of the province is covered with forests? What effect has this on the animal life?

How much more are the fish caught by New Brunswick fishermen worth when they are placed on the market than when they are taken from the water?

How does the salary of the lieutenant-governor of New Brunswick compare with that of the mayor of Chicago?

Which has jurisdiction over a larger population?

What are the Maritime Provinces? How does New Brunswick compare with the others in area? In population?

What effect has the opening up of the great western region had on agriculture in New Brunswick?

What proportion of the school teachers' salaries do the school districts have to raise? Where does the rest of the money come from?

Name the water boundaries of the province. The land boundaries. What state in the American Union does this province border upon?

How does the annual potato crop compare in value with the annual catch of fish?

Of what other territories did New Brunswick formerly constitute a part? How did the American Revolution aid in the growth of this region?

How does the density of population per square mile compare with that of Illinois? With that of Ontario?

How does the most important crop compare in value with the three next most important combined?

What does the statement that a part of this province "belongs geologically to the Carboniferous Age" tell you about the mineral possibilities?

How does the annual catch of fish compare with the capital invested in the fishing industry?

What fuel is named for a county in this province? Describe it. For what was it formerly used?

What governmental handicap to development did New Brunswick long contend against? When was a change made?

How does the railway mileage per one hundred square miles of area compare with that of Ontario? Of Alberta? Of Illinois?

Brunswick soon suffered from irresponsible government, a condition which also prevailed in Nova Scotia and the other provinces. In the long struggle to secure responsible government the leader was Lemuel Allan Wilmot, a biography of whom appears in its alphabetical order in these volumes. Responsible government was finally established in 1848. In 1867 New Brunswick, under the leadership of Sir Samuel Leonard Tilley, became one of the original provinces of the Canadian confederation.

Soon after confederation a movement arose for the abolition of separate Roman Catholic schools. The proposal naturally met strong opposition, but was carried in 1871. In 1875 a compromise was effected by which Roman Catholic children are given special instruction by teachers of their own faith under certain conditions. Since then local issues have played an important part in political campaigns, and the Liberals and Conservatives have alternated in office with more or less regularity. H.V.B.

Consult Perley's *On the Early History of New Brunswick;* Hannay's *History of New Brunswick.*

Related Subjects. The following articles in these volumes may be consulted by the reader interested in New Brunswick:

CITIES AND TOWNS

Campbellton	Moncton
Chatham	Newcastle
Dalhousie	Sackville
Edmundston	Saint John
Fredericton	Saint Stephen
Grand Falls	Woodstock

LEADING PRODUCTS

Apple	Lobster
Fur	Lumber
Hay	Potato
Herring	Sardine

RIVERS

Miramichi	Saint John
Restigouche	

NEW BRUNSWICK, N. J., the county seat of Middlesex County and a manufacturing city, situated north of the geographical center of the state, at the head of navigation of the Raritan River, fifteen miles from Raritan Bay, and at the eastern extremity of the Delaware and Raritan Canal. New York City is thirty miles northeast. Railway transportation is provided by the Pennsylvania and the Raritan River railroads, and electric lines extend from the city in various directions. In 1910 the population was 23,388; it had increased to 32,779 in 1920, a gain of forty per cent. The area of the city exceeds four square miles.

New Brunswick has a large number of manufacturing houses, among which cigar factories take the lead; these employ about 1,400 people. Rubber works, wall-paper factories, hosiery mills, linoleum factories and automobile plants also have an extensive output. Since there are good shipping facilities by land and water, the city has considerable trade in coal, cotton, raw material for manufacturing purposes and general merchandise.

For its size, New Brunswick offers exceptional educational opportunities. In addition to its public schools, it has Rutgers College, the Theological Seminary of the Dutch Reformed Church in America, the state agricultural and mechanical college, with the state model farms; Saint Agnes Academy; the Voorhees and Gardner A. Sage libraries, and the Carnegie Library. A Federal building, the county record building, a $175,000 bank building and a $175,000 high school are noteworthy structures. The Pennsylvania Railroad passes through the city on a viaduct and enters it by a magnificent stone bridge over the Raritan River. The park reservations of the city include 229 acres.

From the time it was settled in 1681 until 1697, this site was called Prigmore's Swamp. Later, John Inian built a ferry across the river and the name was changed to *Inian's Ferry;* in 1714 the present name was adopted in honor of the German House of Brunswick. The place was granted a royal charter in 1730, was incorporated as a town in 1736 and chartered as a city in 1784. New Brunswick was the scene of considerable activity during the Revolutionary War. The commission form of government was adopted in 1915.

NEW BRUNSWICK, UNIVERSITY OF, an institution for higher education, located at Fredericton, N. B. The University of New Brunswick is the head of the public school system of the province, and is open to students of both sexes who can pass the entrance examinations. The courses of instruction are divided, according to the system of English universities, into ordinary and honor courses. The degrees offered are A. B. (Bachelor of Arts) and B. S. (Bachelor of Science), as well as the usual higher and honorary degrees. The enrolment includes about 200 students. There are about a dozen professors, and the library contains about 15,000 volumes.

The College of New Brunswick, which was founded in 1800, was the predecessor of the present university. After 1805 the college received annual grants from the province, and

after 1829 also obtained financial assistance from the British government. In 1828 the college received a royal charter, and for the following thirty-one years was known as King's College. It was reorganized in 1859 as the University of New Brunswick. It is interesting to note that since 1845 the university has had no religious tests of any kind except for professors of theology.

NEWBURGH, *nu'berg,* N. Y., a city in Orange County, noted for scenic beauty, commercial progress and historical associations. It is situated five miles above the Highlands of the Hudson River and on the west bank of that stream, in the southeastern part of the state, fifty-seven miles north of New York City, fifteen miles south of Poughkeepsie and ninety-five miles south of Albany, the state capital. Transportation is provided by water and by the West Shore, the Erie and the Ontario & Western railways. The river at this point expands into a bay one and one-fourth miles wide; ferries make frequent trips daily to Beacon, on the opposite bank, and steamers ply between Newburgh and other towns on the river. The population was 27,805 in 1910; the state census of 1915 reported 27,876, and the Federal census of 1920, 30,272. The area of the city is nearly four square miles.

Description. Newburgh is a natural park of unusual beauty, overlooking the Hudson River and the Highlands from an elevation of 300 feet. The finest residences and Downing Park occupy the highest sections of the city, from which is obtained a magnificent view of the surrounding country, with the Catskill Mountains to the northwest. Orange Lake Park, six miles distant, is a popular year-round resort, being noted for its ice yachting and skating races in winter. The most notable of the city's buildings are the post office, public library, the $110,000 Y. M. C. A. building, the $115,000 Masonic Temple and the Palatine Hotel. Besides the public schools, there are Mount Saint Mary's, Saint Patrick's and Newburgh academies.

Industries and Trade. The total value of the annual output of the city's numerous and varied industrial plants exceeds $11,000,000; the leading product of these is a leatherette which is extensively used in upholstering by railroads and automobile manufacturers. The largest lawn-mower plant in the United States is located here and the sugar-making machinery of Newburgh is widely known. In addition to these, there are manufactures varying from silks, lace and perfumes to planing-mill products, boilers and heavy machinery. The shipyards are the largest on the Hudson River. Newburgh has an important trade in agricultural and dairy products, the adjacent country being famous for its extensive dairies and for its superior butter. Large quantities of coal, grain and flour are here transferred to barges and coasting vessels.

History. The first settlement at Newburgh was made in 1709 by Germans from the Rhenish Palatinate, who called it the Palatine Parish by Quassaic. In 1752 the name was changed to the Parish of Newburgh for Newburgh, Scotland, by Scotch who had largely replaced the Germans. Newburgh was the headquarters of the American army (the Hasbrouck Mansion), in 1782 to 1783, and it was here that Washington wrote his famous rebuke to Lewis Nicola, who suggested making him king. Here, too, the American army was formally disbanded June 23, 1783, and to commemorate the event the state and Federal governments have erected the Tower of Victory on the grounds. The Hasbrouck Mansion is now owned by the state and is used as a historical museum. Newburgh was incorporated as a village in 1800 and received its city charter in 1865. In 1916 the commission form of government was adopted.

NEW'BURYPORT, Mass., a port of entry and one of the three county seats of Essex County, Salem and Lawrence being the other two. It is situated in the extreme northeastern part of the state and on the Merrimac River, about three miles from the Atlantic Ocean. Boston is thirty-five miles southwest by way of the Boston & Maine Railroad. Interurban lines communicate with cities and towns in all directions. Newburyport was a part of Newbury from the time it was settled in 1635 until 1764, when it was incorporated as a separate town; in 1851 it was chartered as a city. The population was 14,949 in 1910; in 1920 it was 15,609. The city has an area of fourteen and one-half square miles.

Newburyport has a good harbor for large vessels; coasting schooners bring considerable trade to the city, and it is a distributing point for coal. Formerly shipbuilding was an extensive and important industry; in 1920 it had 64 varied industries, employing 3,960 wage-earners, $13,554,000 capital invested, and products worth that year about $20,595,000. The city has many features of interest, among which are Old South Church, which contains the tomb of George Whitefield, the founder of Calvanistic

Methodism; the house where William Lloyd Garrison was born; the old Tracy Mansion, built in 1771, now a part of the public library building; the stone "garrison" house built in the shape of a cross, with walls four feet thick —a specimen of the old architecture of the city —and the Marine Museum.

There are memorials to George Washington, to William Lloyd Garrison and to the soldiers and sailors of the War of Secession. There are three parks, a home for old ladies, a hospital, a Y. M. C. A. building and the Putnam free school.

NEW CALEDONIA, *kal e doh' ni a,* a mountainous island in the South Pacific Ocean, entirely surrounded by a large coral reef which lies from five to fifteen miles from the shore. The southernmost of the Melanesian Islands, it is situated 850 miles east of Australia, where it was discovered by Captain Cook in 1774. Its area is a little less than that of the state of New Jersey. On this long, narrow strip of land, for it is 240 miles long and only thirty miles wide, there are two parallel ranges of mountains running almost its entire length. In their mines there are rich deposits of gold, silver, lead, copper, nickel, cobalt, iron and coal, the output of nickel being the most valuable. New Caledonia and Ontario, Canada, are the two chief sources of the world's supply of nickel ore.

The island carries on a thriving import and export trade, the principal articles of export being minerals, canned meats and coffee. Numea, the chief port, is connected by rail with Bourail, the capital, and there is regular steamboat communication with Sydney, in New South Wales. New Caledonia is a French possession, and until 1896 was used chiefly as a settlement for convicts. Since that time no prisoners have been sent there, and the convict population is steadily decreasing. In 1921 it had a population of 50,600; of these, 28,075 were natives, that is, Melanesians of mixed blood.

NEWCASTLE, *nu' kas'l,* a town in New Brunswick, the county town of Northumberland county. It is on the left or north bank of the Miramichi River, at the head of deep-water navigation, is a port of entry and has a considerable coasting trade, especially in lumber and iron ore. It is five miles from Chatham by river, 114 miles northeast of Fredericton and seventy-nine miles northwest of Moncton by rail. The main line of the Intercolonial passes through the town. Sawmills, sash and door factories, a chair factory and wagon works are the principal manufacturing establishments. There are also several large sawmills at Nelson, directly opposite Newcastle. The town owns its electric light, sewerage and artesian water systems. A convent, an academy and a hospital erected in 1916 are conspicuous among the institutions. Population in 1911, 1,672; in 1921, 1,784.

NEWCASTLE, next to Sydney the largest city of New South Wales, and the most important coaling port in the Southern hemisphere. It lies on the east coast of Australia, at the north of the Hunter River, 102 miles by rail and sixty-two miles by sea northeast of Sydney. It is a prosperous, modern city, with good streets and fine public buildings, conspicuous among which are the railway station, post office, customhouse, a school of art, a museum and the Victoria Theater. Of the city's many handsome churches the most notable is Christ Cathedral (Anglican). The fine harbor of the place has an area of 540 acres, affording berthing room for vessels of 4,000 tonnage, and is defended by forts and breakwaters. The total amount of tonnage entered and cleared at Newcastle is nearly 4,000,000 a year. The chief exports are coal, wool, coke, horses, cattle, frozen meat, tallow, hides, minerals and agricultural produce. The city has copper-smelting works, a brewery, foundries, carriage and boot factories, shipbuilding yards and a steam biscuit factory. It is the see of an Anglican bishop and the seat of a United States consul. Population in 1921, including suburbs, 62,900.

NEW CASTLE, Ind., the county seat of Henry County, situated on the Blue River and in the eastern part of the state, about midway between its northern and southern borders. Indianapolis is forty miles southwest and Muncie is twenty miles north. Transportation is provided by the Cleveland, Cincinnati, Chicago & Saint Louis, the Lake Erie & Western and the Pittsburgh, Cincinnati, Chicago & Saint Louis railways, and by interurban lines which communicate with cities and towns north, south and west. Good water power and natural gas and fine shipping facilities have been important factors in the development of the city. Manufacture is here represented by sheet-iron, steel and bridge works, and automobile, clothing, furniture and piano factories. Two miles north of the city is the Indiana Village for Epileptics. In 1910 the population was 9,446; it had increased to 14,458 in 1920, a gain of fifty-three per cent in ten years.

NEW CASTLE, PA., the county seat of Lawrence County and an important manufacturing city in the west-central part of the state, about twelve miles from the Ohio state line and fifty miles northwest of Pittsburgh. It is situated at the junction of the Shenango and Neshannock rivers and is on the Erie, the Pennsylvania, the Pittsburgh & Lake Erie, the Baltimore & Ohio, the Buffalo, Rochester & Pittsburgh and other railroads. There are interurban lines to neighboring towns and cities. The population, which includes a large number of Welsh, Italian and Polish, was 36,280 in 1910 and 44,938 in 1920, a gain of 24 per cent. The area of the city exceeds nine square miles.

New Castle ranks sixth among the manufacturing cities of the state. Large deposits of bituminous coal, limestone, sandstone, fire clay and iron ore furnish materials for the chief industrial establishments. These include metal-working plants, such as steel and rolling mills, blast furnaces, tin-plate and terneplate mills and car-construction shops; cement works and manufactories of pottery, nails, fire brick, stoves, plows, boilers, radiators and machinery. The knitting mills produce from eight to ten hundred dozen pairs of hosiery per day. The industries of the city employ nearly 17,000 men and the annual value of products averages about $38,385,000. New Castle is surrounded by a fertile agricultural country and has an important trade in farm products and live stock.

The noteworthy buildings include the Federal building, city hall, public library, Y. M. C. A. and Y. W. C. A. buildings, high school, opera house, club buildings and churches. The city has the Almira Home for Aged Women, the Shenango Valley Hospital and the New Castle Hospital. There are several small parks, and a short distance from the city is the noted pleasure resort, Cascade Park.

New Castle was founded in 1812, incorporated as a borough in 1825 and became a city in 1869. The city charter was revised in 1889. A modified commission form of government was adopted in 1913. R.MC K.W.

NEWCASTLE-UPON-TYNE, the great center of the coal regions of Northumberland and Durham, and a county borough of England, situated on the left bank of the River Tyne, 272 miles by rail northwest of London and eight miles inland from the sea. The English system of railways had its origin in this city; to-day its locomotive and engineering works are among the largest in the country. An old bridge (1849), connecting Newcastle with Gateshead, on the opposite bank of the river, was designed and constructed by Robert Stephenson, son of the famous inventor, George Stephenson. Three other bridges at this point span the river, whose waters from Newcastle to the sea are crowded with trading vessels and whose banks are lined with docks and factories. The city boasts one of the largest meat and vegetable markets in the United Kingdom. It ships out great quantities of coal, iron, copper, lead, alkali and machinery, and has prosperous manufactories of stained glass, soda, bleaching powder, vitriol, salt, earthenware, fire brick, gas retorts, fire-clay pipes, grindstones and cement. Steel shipbuilding is carried on extensively. In the city are famous ordnance works owned by Lord Armstrong.

Newcastle dates from the Roman period, and on its site was a fort which helped to guard the great wall of Hadrian. After the Romans withdrew, the settlement was for a time the residence of a colony of monks. About 1080, Robert, eldest son of William the Conqueror, began the erection of a castle on the river bank; from this the present name of the city was derived. The walls of the old town and other traces of its past history have been destroyed for the most part in the modern development of the place. A castle on the site of the one built by Duke Robert is now cared for by the Newcastle Society of Antiquaries. The city is the seat of the medical and science colleges of Durham University. Population in 1921, 274,955.

NEWCOMB, *nu'kum,* SIMON (1835-1909), an American astronomer, was born in Wallace, Nova Scotia. He received his early education in his father's school in Nova Scotia, emigrated to the United States at the age of eighteen and began teaching in Maryland. In 1857 he was appointed computer on the *Nautical Almanack* at Cambridge and in 1858 graduated at the Lawrence Scientific School. He was a keen mathematician and a practical and accomplished astronomer and wrote authoritatively also on finance and political economy. He was appointed pro-

SIMON NEWCOMB

fessor of mathematics in the United States Navy in 1861, and personally supervised the construction of the 26-inch equatorial telescope at the Naval Observatory. From 1894-1901 he was professor of mathematics at Johns Hopkins University. He directed several eclipse expeditions, was secretary of the Transit of Venus Commission in 1871-1874, and in 1882 observed the transit of Venus at the Cape of Good Hope. Becoming director of the *Nautical Almanack* in 1877 he held that post until age compelled his retirement in 1897.

Newcomb's work was fittingly recognized in America and Europe; he was a member of nearly every Imperial and Royal Society of Europe and was the first American after Benjamin Franklin to be made an officer of the Legion of Honor of France. He was president of the American Association for the Advancement of Science (1877), president of the Society for Psychical Research (1885-1886), president of the American Mathematical Society (1897-1898) and vice-president of the National Academy of Sciences from 1883 to 1889. He received numerous prizes and degrees from societies and universities both in America and Europe.

NEW ENGLAND CONFEDERATION, the name of a colonial union formed by Massachusetts, Plymouth, Connecticut and New Haven in 1643, which lasted for forty years. It is of special interest as the first attempt at union among the colonies. The official name was *The United Colonies of New England.* It was organized to secure united action against the Dutch, the Indians and the French. Articles of confederation were carefully drawn up and adopted; among them was a clause providing for the return of fugitive servants, which was probably the origin of later fugitive slave laws and American extradition. Authority was vested in a board of eight commissioners, two from a colony, but each colony had full control of local affairs.

NEWFOUNDLAND, *nu'fund land,* a rugged, fog-swept island lying off the coast of North America, directly across the entrance to the Gulf of Saint Lawrence, forming with Labrador since 1917 the Dominion of Newfoundland. It lies nearer to Europe than any other part of the North American continent, its most eastern point being only 1,640 miles from Valentia, Ireland. It is separated from Cape Breton Island on the southwest by Cabot Strait and from Labrador on the northwest by Belle Isle Strait.

Physical Features. The island, roughly triangular and covering an area of 42,734 square miles, is about equal in size to the state of Virginia, or twice the size of Nova Scotia. Its steep cliffs and rocky headlands are penetrated by deep fiords and by many large and sheltered bays which are dotted with a great number of rugged islets.

The interior is a rocky table-land, broken by low, parallel mountain ranges crossing the island from northeast to southwest, and by isolated peaks known as *tolts.* Great herds of reindeer roam the straggling forests and barren hills, and the bear, wolf, lynx, marten and beaver lure the trapper into the wildest parts of the interior. The Newfoundland dog (which see) is the only animal peculiar to the island, but it is now found there but rarely. In the valleys there are wide marshes and many lakes and ponds bordered by forests of pine, spruce and fir. The principal streams follow the trend of the mountain ridges. The Exploits River, flowing northeast through a chain of lakes, nearly crosses the island, and the Humber and Gander are other large streams.

The northeast coast, which is washed by the Arctic Current, is cold and damp, and the bays are filled with floating ice and are subject to dense fogs, but the climate of the western shores is more temperate than that of Canada as a whole.

The People. There is little or no immigration, and the inhabitants of the island have changed but slightly in character from the early English, Scotch and French fisher folk from whom they are descended. The popula-

LOCATION MAP

tion is almost entirely confined to the Avalon Peninsula on the southeast coast, where the capital and largest city, Saint Johns, is located. Including the 4,016 inhabitants of Labrador, the population of the colony in 1921 was 254,368. The largest religious bodies are the Roman Catholics, Anglicans, Methodists and Salvation Army. The schools are denominational and are controlled by four superintendents, one representing each of these religious bodies, and by inspectors for the Presbyterian and Congregational schools.

Industries. The coast waters swarm with many varieties of fish and to its fisheries the colony owes its very existence. More than one-fourth of the entire population are engaged in the industry. Cod is the most important product, and although the cod fisheries have been prosecuted for centuries, the waters along the coasts of Newfoundland and Labrador still produce a large part of the world's supply. Lobster, herring and salmon are also caught in large quantities, and whaling is an important branch of the fishing industry.

Because for many years little attention was paid to any interest but fishing, the arable river valleys long lay idle and neglected. The government offered a bonus for cleared land in 1891, and since that time agriculture has been gradually increasing in importance. Potatoes, turnips, hay and oats are the chief products of the soil, and sheep, cattle, swine and horses are raised.

Copper is mined extensively and there are valuable deposits of lead, iron, silver, coal, gypsum, marble, granite and building stone. Manufacturing is represented chiefly by the pulp and paper industry. At Grand Falls there are pulp and paper mills which are producing 100 tons of paper and 240 tons of pulp every twenty-four hours.

Communication and Trade. There are over 850 miles of railroad, most of this mileage being owned by the government, and in districts near the coast transportation is good. There is steamship communication with Canada, the United States and Great Britain, and with these countries the colony has considerable trade. The chief exports are dry codfish, pulp and paper, iron ores, tinned lobster, sealskins, herring, salmon and cod oil, seal oil and whale oil. The imports consist principally of foodstuffs, textiles, coal, machinery and hardware.

Government and History. The laws of the colony are made by a Parliament consisting of a legislative council of fifteen members, nominated by the governor in council and holding office for life, and a house of assembly of thirty-six members elected by manhood suffrage. The executive authority is vested in the governor, who is appointed by the Crown, and by a council of nine members who are responsible to the lower house (house of assembly).

Newfoundland, having been discovered in 1497 by John Cabot, is the oldest of Great Britain's colonial possessions. The earliest settlers were Portuguese, Spanish and French fishermen, and when Sir Humphrey Gilbert in 1583 took possession of the island for England and tried to found a British colony, his attempts were frustrated by the French, who remained in control until 1713. By the Treaty of Utrecht (1713), France recognized the sovereignty of England but reserved the exclusive right to the cod fisheries on the west coast and to Miquelon and Saint Pierre islands as stations for fishing fleets.

The development of the colony was retarded by the exclusion of all interests but fishing, and the government was in the hands of the fishing captains until 1832, when it was made representative. The rivalry between the French and English continued to exist until 1904, when France gave up the rights on the west coast in

return for the Los Islands (West Africa) and a strip of territory in Africa.

In 1905 trouble with the United States arose over the fishing rights, but the controversy was settled by the Hague Tribunal in 1910.

Frequent advances have been made by Canada to induce the island to become a province of the Dominion, and Federation has been a leading political issue in the colony (see CANADA, subtitle *History of Canada*). In the recent economical development of the island Sir Robert Bond, Sir William Whiteway, Sir William Winter and Sir R. G. Reid have been prominent. On January 1, 1917, the colony became prohibition territory. E.B.P.

Consult Willson's *The Truth about Newfoundland, the Tenth Island;* Smith's *The Story of Newfoundland.*

Related Subjects. The reader is referred to the following articles, which will be of interest in connection with a study of Newfoundland:

Cod	Herring
Copper	Lobster
Fish	Paper
Fox	Saint Johns
Grand Banks	

NEWFOUNDLAND DOG, a large, handsome dog, one of the most intelligent of the family. With the exception of the great Saint Bernard of Switzerland, no other dog is so splendidly useful to mankind, for its work in saving people from drowning is as notable as the labor of the noble rescuer of lost travelers in the Alpine snows. The Newfoundland dog was first brought to the attention of Europeans toward the close of the eighteenth century, and they named the animal for the British colony on which it was found. As the original dogs of that region are of different breed, it is supposed that the Newfoundland is a result of the crossing of the native dogs and others introduced from Europe in the sixteenth century and later—the pointer in particular. So highly is the Newfoundland regarded that few if any of the species are left on the island of Newfoundland, but these dogs have been bred in large numbers elsewhere, especially in America and England.

NEWFOUNDLAND DOG

The Newfoundland is a noble appearing animal, with strong, broad shoulders, powerful legs, long tail and massive head. Usually the shaggy coat is black, but a light coat with black markings is by no means uncommon. Some of these dogs have tan markings. A full-grown animal is about twenty-seven inches high. Aided by its powerful chest and limbs and its webbed feet, it swims expertly and it brings to its task of life-saving remarkable intelligence and alertness. The hunter, too, finds the dog a splendid retriever. One of Sir Edwin Landseer's most famous canvases pictures a Newfoundland dog.

NEW GLASGOW, *glas'ko,* a town in Pictou County, Nova Scotia, in the north-central part of the Nova Scotia peninsula, eight and one-half miles south of Northumberland Strait. By the Intercolonial Railway it is sixteen miles south of Pictou, eight and a half miles south of Pictou Landing, forty-two and a half miles northeast of Truro and 104 miles northeast of Halifax. It is on the East River, which is navigable for the small steamers running between Prince Edward Island and the mainland. Population in 1911, 6,383; in 1921, by Dominion census, 8,974.

New Glasgow is one of the most important coal-mining and manufacturing communities in Canada. It has the head offices and main plant of the Nova Scotia Steel & Coal Company and of the Eastern Car Company, which makes all kinds of steel and wooden freight cars. Each of these plants employs over a thousand men. Also important are bridge works and factories for making boilers, mining tools and various kinds of machinery, steel and wire fencing, glass and bricks. In 1915 New Glasgow added a new branch, the manufacture of shells for the Canadian and Allied armies in Europe, to its flourishing industries. The town's preëminence in the manufacture of steel and iron products is due, of course, to its proximity to the rich coal and iron mines of the province.

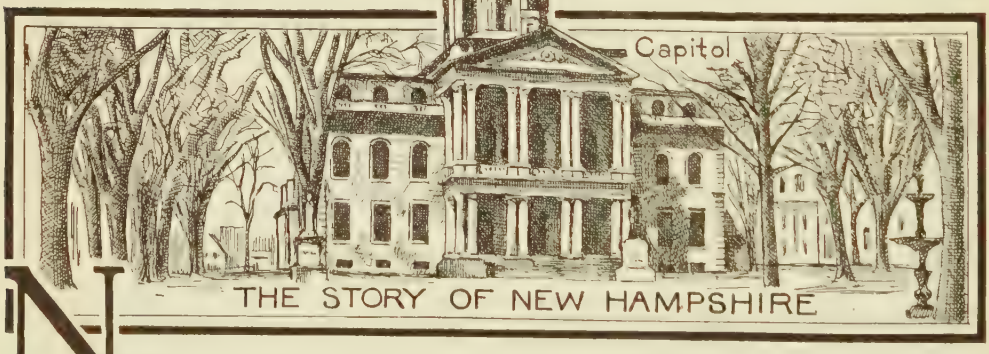
The town was founded in 1785 and was named for Glasgow, Scotland. It was incorporated in 1875. J.R.

NEW GUINEA, *gin'i,* an island in the Pacific Ocean lying eighty miles north of Australia, from which it is separated by the Torres Strait (see location map, accompanying article AUSTRALIA, page 483). It is the largest island of the Malayan Archipelago and the second largest in the world, ranking next to Greenland (with Australia considered a continent). With a maximum length of 1,490 miles and a maximum width of 430, New Guinea, exclusive of several coast islands belonging to it politically, has an area of 300,274 square miles. It is therefore nearly as large as North and South Dakota, Nebraska and Kansas combined. At the outbreak of the War of the Nations (1914) it belonged to three nations—Great Britain, the Netherlands and Germany.

British New Guinea, which forms the chief part of the territory of Papua, is the southeastern part of the island. It has an area of 87,786 square miles and an estimated population of 252,000. Of the inhabitants, about 250,000 are native Papuans, a branch of the negro race; there are about 1,200 Europeans. Papua is one of the territories of the Australian Commonwealth (see AUSTRALIA), and includes, besides New Guinea, several adjacent islands. On the main island there are three ports of entry, Port Moresby, Samarai and Daru.

Kaiser-Wilhelmsland, the northeastern section of the island, became a German protectorate in 1884. Its area is 70,135 square miles and its estimated population, 531,000. In October, 1914, shortly after the outbreak of the war, this territory was occupied by Australian troops. Dutch New Guinea, with an area of 151,789 square miles and a population of 200,000, occupies the western portion of the island and is a part of the East Indian outpost province of Ternate (see EAST INDIES, DUTCH).

Conspicuous among the animals of New Guinea are the many gayly-colored birds, especially the brilliant birds of paradise (which see). The soil is fertile, and agriculture is receiving considerable attention in the British territory. At the outbreak of the great war over 20,000 acres in that section were planted to cocoanuts, 6,606 acres to rubber, 3,110 to sisal hemp, and smaller areas to coffee, cotton, vanilla, cocoa, tea, tobacco and other tropical plants. Gold is mined here in considerable quantities, and copper fields are beginning to be developed. There is regular steamship service between Sydney and Port Moresby, and a wireless telegraph station is maintained at the latter port. Under mandate of the League of Nations the affairs of New Guinea have been under control of Australia since May, 1921.



THE STORY OF NEW HAMPSHIRE

NEW HAMPSHIRE, one of the thirteen original states of the American Union, belonging to the New England group. Its rugged granite mountains, the heights of which are nowhere exceeded in Eastern United States except in the Black and Unaka mountains of North Carolina, have given New Hampshire its popular name, THE GRANITE STATE.

Size and Location. Having an area of 9,341 square miles, of which 311 square miles are water surface, New Hampshire is forty-third in size among the states. Its area is about equal to one-third of that of New Brunswick and one-sixth of the state of New York. Cut off from the sea by Maine as far south as Portsmouth Harbor, and by Massachusetts on the southeast, the state has only eighteen miles of seacoast, which is less than that of any of the other Atlantic states. In shape New Hampshire resembles a right triangle, with its sloping side on the west following the Connecticut River, which separates it from Vermont. The right angle is broken by Massachusetts.

The People. In 1920 the population of New Hampshire numbered 443,083, or 49.1 per square mile, over one and one-third times the average density for the United States. On January 1, 1910, the number of people was reported as 430,572. Over one-fourth of the population are foreigners, chiefly French-Canadian, British-Canadian and Irish, and immigration has continued to increase, opportunities for employment being offered to aliens in the numerous factories of the state. Over sixty-two per cent of the inhabitants live in towns or cities; Manchester, with a population of 70,063 (1920), is the largest city and manufacturing center. Other cities with a population over 10,000 are Nashua, Concord, the capital, Dover, Berlin, Portsmouth, Laconia and Keene.

The largest religious body is the Roman Catholic, other important denominations being the Baptists, Methodists and Congregationalists.

Education. Much attention has always been given to education in New Hampshire; the state aims to keep abreast of the times in its educational methods and administration. An organized system has existed since 1647, when the general court of Massachusetts required towns of over fifty inhabitants to maintain schools. Before the nineteenth century the founding of Phillips Exeter, the well-known New England academy for boys, and other similar schools stimulated interest in education and the early development of a good common school system.

Public education is now administered by towns, though there are a few special districts under the state superintendent, who is appointed by the governor. In 1910 the illiteracy in the state was 4.6 per cent, most of which was among the foreigners; the illiteracy among whites of native parentage was only .8 per cent. In 1914 there were 63,991 pupils enrolled in the public schools. Pupils living in towns where there are no high schools are educated at public expense in towns where high schools are maintained. The educational fund is derived from local and state taxes. Normal schools are maintained at Keene and Plymouth. Dartmouth College, founded at Hanover in 1769, from which have been graduated some of the most distinguished men of the United States; the New Hampshire College of Agriculture and Mechanical Arts at Durham; and Saint Anselm's College, a Roman Catholic institution at Manchester, are the only institutions of collegiate rank. Saint Paul's School at Concord is a famous academy for boys.

Charitable and penal institutions under the state board of charities and corrections include: a school for the feeble-minded and a soldiers' home at Tilton; a state sanitarium at Benton; an industrial school at Manchester; an insane asylum and the state prison at Concord. Almshouses and houses of correction are maintained in each county. The blind are systematically cared for and educated.

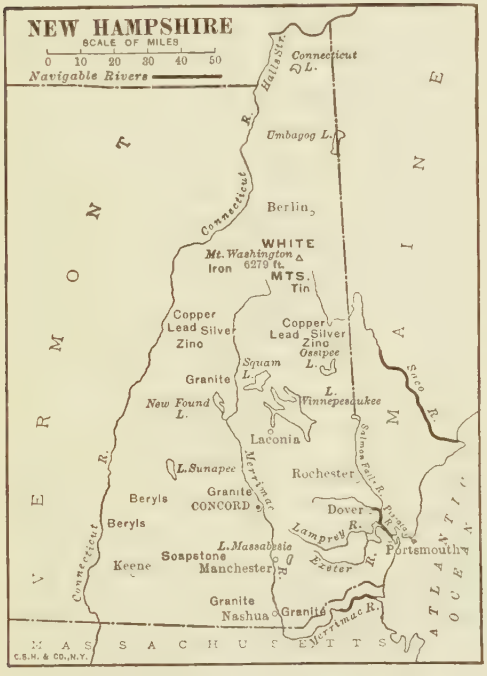
The Land. New Hampshire is famous for its delightful scenery of forest-covered hills and rough mountains, filled with deep glens, rushing streams, waterfalls and beautiful lakes. The mountains, traversed by many excellent roads, are among the most beautiful and popular pleasure grounds of the East. The only low part of the state is in the southeast, where the land meets the sea in sandy beaches along which there are salt marshes and tidal creeks. Beyond the Merrimac River it rises to broad fields and rolling hills, which become more rugged in the central part of the state, merging into the lofty Presidential and Franconia ranges of the White Mountains, which cover an area of about 1,400 square miles in the north-central region.

The Presidential Range is the highest, many of its summits rising above an elevation of 5,000 feet. The loftiest peak is Mount Washington, with an altitude of 6,279 feet, the highest mountain, next to Mount Mitchell in North Carolina, in the Appalachian system. Mounts Lafayette and Lincoln, over 5,000 feet above the sea, are the highest mountains of the Franconia Range, which is separated from the Presidential Range on the east by the famous Crawford Notch, through which flows the Saco River.

The Franconia mountains are traversed by the Franconia Notch, through which the Pemigewasset River flows. Profile Mountain, the most interesting feature of the Notch, overhangs a deep, romantic glen. Its upper projection, which resembles a human profile, is known as *The Old Man of the Mountains* and was immortalized by Hawthorne in *The Great Stone Face*. Here also is Franconia Flume, a fissure sixty feet deep, into which pours a foaming torrent. Mounts Moosilauke and Monadnock, Sunapee and Kearsarge mountains are isolated peaks of lofty elevation. A number of bald peaks, rising above the tree line and reflecting the sun on their rocky summits, have the appearance of snow-covered mountains and have given to these ranges the name "White Hills," later changed to White Mountains.

East of the White Mountains, from which they are separated by the valley of the Peabody River, are a number of isolated peaks, the highest of which is Carter Dome, with an altitude of 4,880 feet.

In the north the hills are rounded, the valleys wide and rolling and much of the timberland is cleared and devoted to farms. The only large estuary is at the mouth of the Piscataqua, where Portland Harbor lies half in New Hampshire and half in Maine. Beyond this bay,



OUTLINE MAP OF NEW HAMPSHIRE

Showing boundaries, principal rivers, chief cities, mining and quarrying centers, and the highest point of land in the state.

nine miles from shore, lies a group of bleak rocky islets, the Isles of Shoals.

Rivers and Lakes. The Connecticut, the longest river of New England, rising in Connecticut Lake and forming the boundary between New Hampshire and Vermont, drains the entire western section of the state southward into Long Island Sound. The swift Merrimac, one of the greatest power-yielding streams of the world, rising in the mountains in the central part of the state, drains the south-central section. Its banks are lined with factories and it is said to turn more cotton spindles than any other river of the world. Saco and Androscoggin rivers, rising in the northern mountains, flow south in New Hampshire, then turning east, make their way through Maine to the sea. The Piscataqua, fed by Salmon Falls, flows into the sea in a broad estuary, where, as its name, meaning fishing waters, indicates, are the best fishing grounds of the state.

The swift flow of these rivers is equalized by waters stored in hundreds of beautiful lakes. The largest of these is Lake Winnepesaukee, sixteen miles long and six miles wide, dotted with 264 wooded islands and enclosed by hills and mountains. Squam, New Found, Winnisquam and Ossipee lakes near Winnepesaukee, Connecticut Lake and Diamond Pond in the White Mountains are other lakes of noted beauty.

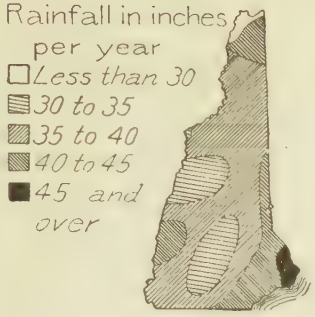
Climate. New Hampshire has severe winters, the ground being covered with snow and most of the rivers frozen from autumn to spring. Owing to the high elevation, the climate averages cooler than that of Maine. The warmest section is on the lower Merrimac, but here the average winter temperature is 21° F. The annual snowfall in the northern mountains is seven to eight feet. The summers are cool and pleasant. The average temperature for July is 70° F. in the south and 67° F. in the northern part of the state. Rainfall is plentiful and fairly evenly distributed, the annual precipitation averaging forty-five inches.

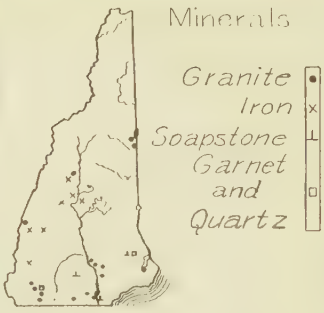
Agriculture. In general the soil is poor, containing much stony boulder clay and glacial drift. Fertile sections are found in the bottom lands of the Connecticut and other rivers, and farm lands occupy about one-sixth of the total area of the state. Many farms in the sterile sections of the north-central region have been abandoned and sold for country homes, and the roads improved and features of scenery advertised to attract summer colonies.

Live stock and poultry raising, dairying, fruit and truck farming are extensive branches of agriculture. The most important crop is hay and forage; others are potatoes and Indian corn. Apples are the most plentiful of the fruits, and the strawberry the most important small fruit.

Forests. Nearly one-third of the state, comprising the White Mountain region and Coos County, is forest country. Primeval forests still yield red spruce, which is the chief merchantable timber of the state and in the production of which New Hampshire is exceeded only by Maine. The output of spruce is influenced by its increasing use in the manufacture of paper and wood pulp. Much of the virgin growth of white pine has been cut, but New

NEW HAMPSHIRE

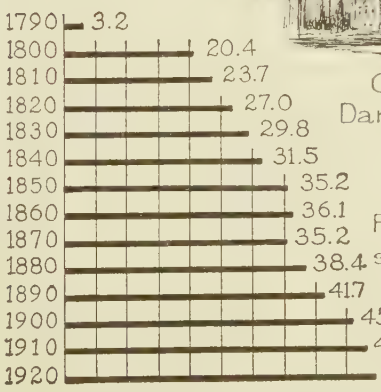




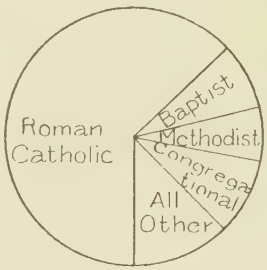
Buildings of Weather Bureau on summit of Mount Washington, in September frost

The Old Man of the Mountain, Franconia Notch

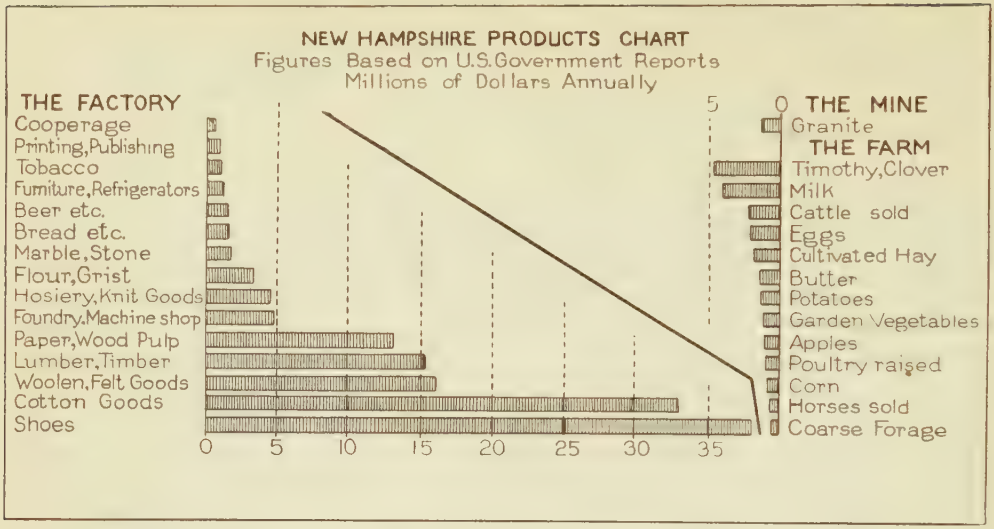
College Hall, Dartmouth College, Hanover



People per square mile by decades



Religions



Hampshire ranks fifth among the states in its production. The sugar maple, birch, beech, white oak and cedar are also abundant. The government coöperates with the state in forest-fire protection, and there is an organization of private owners for the same purpose. New Hampshire ranks seventh among the states in its appropriation for the support of the state forest department.

Minerals. Granite and mica are quarried in large quantities and are the chief mineral products of the state. Until 1867 New Hampshire produced all of the mica in the United States, but now North Carolina has a greater output. At the census of 1920, New Hampshire ranked fifth in the production of granite, and has held this place in most of the succeeding years. The principal quarries are in Hillsboro, Merrimack, Cheshire and Carroll counties, and the annual output of the state is valued at one to one and a half million dollars. Scythestones, slate, limestone, spar, occasional gems and mineral waters are other mineral products. Gold, silver, copper, lead and other ores are found only in small, often inaccessible and usually unprofitable, quantities.

Manufactures. New Hampshire's importance as a manufacturing state is due to the great amount of available water power, the proximity of markets, numerous towns and excellent transportation. In 1910, this little state ranked third among the New England states in the output of cotton goods, being surpassed by Massachusetts and Rhode Island; seventh among all the states in the same industry; fourth among the states in the production of boots and shoes; eighth in the manufacture of paper and wood pulp; eighth in woolen, worsted and felt goods; twenty-eighth in the total value of its manufactured products. The leading industries are carried on in the south, along the Merrimac River. Lumber, bakery and foundry products, hosiery and knit goods and flour are also important products. Manchester and Nashua are the most notable manufacturing cities.

Transportation. There are excellent railroad accommodations, especially in the southern part of the state, where every town of importance has access to railroad lines. In 1920, there were 1,253 miles of railroad in the state, the chief lines being the Boston & Maine, Maine Central, and the Grand Trunk. The first cog railroad in the United States was the Mount Washington Railroad, which makes a steep ascent of 3,625 feet in two and three-quarters miles. It is operated during the summer for tourists. There are also over 200 miles of electric railway in the state. A board of three commissioners appointed by the governor and council have the general supervision of railroads.

Government. The present constitution is a revised and amended form of that adopted in 1877, which was practically the fourth constitution of New Hampshire. A convention for its revision may be called every seven years if voted for by two-thirds of the qualified voters.

The *legislative power* is vested in the general court, consisting of a senate of twenty-four members and a house of representatives apportioned according to the population; all towns

having over 600 inhabitants are entitled to one representative for a full term and one for each additional 1,200 inhabitants. Those districts having a population of less than 600 are entitled to one representative for a proportional part of a term.

The *executive* power is vested in a governor and an advisory council of five members elected for two years. A secretary of state, treasurer and commissary-general are elected by the general court.

The *judiciary* department consists of a supreme and a superior court, each having one chief justice and four associate judges; probate courts and justices of the peace. Practically all judges are appointed by the governor for indefinite terms except the justices of the peace, who are appointed for five years. A juvenile court law is applicable to all under seventeen years of age. Capital punishment is inflicted only upon the request of a jury.

Suffrage is granted male citizens twenty-one years of age and over who are able to read the constitution in English and who have not been convicted of certain crimes. Citizens who were sixty years of age or upward on January 1, 1904, were exempted from this literary qualification. Labor disputes are settled by a state board of arbitration, and child-labor laws, workmen's compensation acts and mothers' pension laws are in effect. In November, 1916, state prohibition was voted, effective in 1918.

History. The New Hampshire coast was explored by Martin Pring, Samuel de Champlain and Captain John Smith. In 1622 the territory between the Merrimac and Kennebec rivers, extending inland sixty miles, was granted to Mason and Gorges as the "Province of Maine." In 1629 the region between the Merrimac and Piscataqua was given to Mason, the founder of New Hampshire, which he named after his native county, Hampshire in England. Fishermen from Massachusetts settled at Little Harbor and Dover Neck, and Exeter was settled by Massachusetts religious refugees. By 1643 all of the settlements had voluntarily joined Massachusetts, and although New Hampshire was declared a royal province in 1679, it was practically governed by Massachusetts until the Revolution.

New Hampshire was conspicuous in its stand against British taxation and furnished more than its share of troops to the Continental armies. Adopting a constitution in January, 1776, it was the first state to form a government wholly independent of England. New

Research Questions on New Hampshire

(An Outline suitable for New Hampshire will be found with the article "State.")

How many of the following states have altitudes exceeding the loftiest in New Hampshire: Vermont; New York; Georgia; Texas; Arkansas; Nebraska?

Of what substance much used in the manufacture of stoves does New Hampshire produce a large amount?

How did the state receive its name?

What physical feature of the state has been celebrated in one of the most famous stories in American literature?

Give three factors which have contributed to the growth of the manufacturing industries of this state.

What stand has New Hampshire taken on the prohibition question?

How many Atlantic states have a longer seacoast?

What river turns more cotton spindles than any other in the world?

What river has a name which indicates one of its chief characteristics?

What is a cog railroad? What distinction has New Hampshire with reference to this kind of railway?

How many states have a larger population? (See list under UNITED STATES.) How many of these more populous states are larger?

Where have most of the immigrants come from?

When was the first system of education organized? Of what colony did New Hampshire form a part at that time?

Why has the state a cooler climate than a neighboring state which lies farther north?

What classes of persons are not allowed to vote?

How does the illiteracy percentage compare with that of New York? How do the illiteracy percentages of the two states for native-born whites compare?

Why have many farms in this state been abandoned? What part of the total area do farm lands occupy?

How large a proportion of the area of the state is covered by the ranges of the White Mountains?

To what comparatively new use has much of New Hampshire's output of spruce lumber been put?

What has the state done to maintain its forests?

How many colonies had a government independent of England earlier than did New Hampshire? How many constitutions has the state had?

Hampshire adopted the Federal Constitution on June 21, 1788, and as it was the ninth state to ratify it, this action assured its final adoption and the establishment of the United States. A second state constitution was adopted in 1784 and practically rewritten in 1792 and 1877.

From 1856 to 1912 New Hampshire was stanchly Republican, and during the antislavery discussion and War of Secession the state ardently supported the Union. In the early twentieth century, several amendments to the constitution were passed, including taxation and primary reforms and the passage of laws curtailing the great political power of railroads.

In 1912 three more amendments were added providing for the election of officers by a plurality vote, the disqualification of voters convicted of certain crimes, and the changing of the basis of representation from property to population. In April, 1917, the legislature passed a state prohibition act, to become effective May 1, 1918. E.B.P.

Consult McClintock's *History of New Hampshire;* Hale's *New Hampshire.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New Hampshire:

CITIES

Berlin	Laconia
Concord	Manchester
Dover	Nashua
Keene	Portsmouth

LEADING PRODUCTS

Boots and Shoes	Mica
Granite	Paper
Lumber	

PHYSICAL FEATURES

Connecticut River	Saco River
Merrimac River	White Mountains

NEW HAVEN, CONN., the first city of the state in population and in manufacturing, and as the seat of Yale University, one of the foremost educational centers in the Union. It lies at the head of New Haven Bay, an inlet of Long Island Sound, eighteen miles northeast of Bridgeport. New York City is seventy-two miles southwest and Boston is 157 miles northeast, by rail. Six branches of the New York, New Haven & Hartford Railway enter the city from various directions, and electric lines communicate with adjacent towns. There is excellent transportation by water. The population increased from 133,605 in 1910 to 162,519 in 1920. Russian Jews and Italians predominate in the foreign element.

Parks and Streets. New Haven is partially encircled by hills which rise into rugged heights from 350 to 400 feet on the east and west, and form a picturesque background for the city. The early settlers planned the streets to cross each other at right angles, thereby forming nine squares, each a mile long, with "The Old Green" as the central square. Around this the people dwelt, and for a time it was their burial ground. Here, too, stood the whipping post, the stock and the pillory. The streets are thickly lined with majestic old elm trees planted more than 100 years ago, and now numbering more than 24,000. Because of these the city has become known locally as *The Elm City.* Though they frequently hide the homes from view, the broad, generous lines upon which the city is built prevent the abundant growth of trees from giving the place a congested appearance. The park reservations cover 1,200 acres, East Rock and West Rock parks being the most noted. The former contains a splendid soldiers' and sailors' monument and the latter has the famous Judges Cave, the hiding place of the regicides, Whalley, Goffe and Dixwell, for whose capture reward was offered by Charles II of England.

Institutions. The campus of Yale University, a world-famous institution of learning, occupies two city blocks which lie directly west of "The Old Green." The buildings and halls of the institution are among the most prominent buildings of the city (see YALE UNIVERSITY). In addition there are the Hopkins Grammar School, a state normal school, Hillhouse High School, the Boardman Manual Training School, the public library (the gift of Mrs. Mary Ives), and the libraries of the New Haven Colony Historical Society and the American Oriental Society. Benevolent institutions include Grace and City hospitals, and two orphan asylums.

Buildings. Noteworthy among the public buildings are the massive $1,500,000 county courthouse, constructed of white marble, the $1,000,000 Taft Hotel, the Second National Bank building and the handsome new Federal building, completed in 1917 at a cost of $1,500,000. Three old churches which face "The Old Green" are buildings of historical interest.

Manufacture and Commerce. New Haven is noted for the variety, as well as for the extent, of its manufactures, among which metal products rank first. The Winchester Repeating Arms Company employs 18,000 people, the New Haven Clock Company has 3,000 employees, and about 5,000 are engaged in making general hardware. The general offices and the large machine shops of the New York, New Haven & Hartford Railway are located here. Through

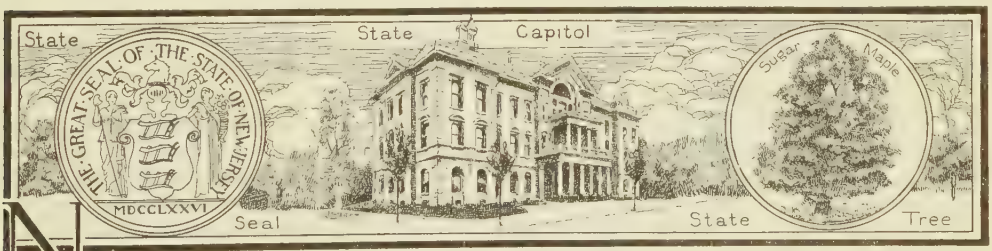
its fine shipping facilities by rail, New Haven has become a distributing point for coal, fertilizer, cement and lumber, all of which are imported by water. The export trade is carried on principally by way of New York. The oyster industry is also important.

History. The site of New Haven was called *Quinnipiac,* the Indian word for *Long River Place,* when a company of Puritans under Theophilus Eaton settled here in 1638. They changed the name to its present one (for Newhaven in England), in 1640. It was a part of a separate colony until 1665, when it was united with Connecticut under the charter of 1662. It was one of the capitals of the state (Hartford being the other) from 1701 until 1874. In 1716 Yale College was removed here from Saybrook, in 1779 the city was captured by the British forces under Tryon and Garth, and in 1784 it was incorporated as a city. From that time its growth was rapid, and greater impetus was given its development by the opening of steamer communications with New York in 1815. New Haven is the burial place of many eminent men, among whom are Noah Webster, Samuel Finley Breese Morse, Lyman Beecher, Eli Whitney and Roger Sherman. F.J.L.

Consult Atwater's *History of the Colony of New Haven.*

NEW HEBRIDES, *heb'ri deez,* a group of islands in the West Pacific Ocean, governed jointly by the British and French. They are included in the Melanesian group, and lie between Australia on the west and the Fiji Islands on the east. To the southwest is New Caledonia (which see), from which the New Hebrides are separated by a deep channel. The main islands of the group are arranged roughly in the form of a great Y. The largest island is 875 square miles in area, and the combined area of the entire chain is 5,100 square miles, a little greater than that of Connecticut. The great bulk of the population of 70,000 consists of natives, who are Melanesians of mixed blood, the prevailing type having black skin, woolly hair, thick lips, sloping forehead and flat nose. Several British and French trading companies are established on the islands, but the European population numbers less than a thousand.

With the exception of a few islands which lie on coral reefs, the New Hebrides are all of volcanic origin, and there are active craters on some of them. The highest elevation, an isolated cone on the island of Lopevi, rises over 4,700 feet above the sea. In the rich soil of the islands, which are watered by numerous streams, tropical plants grow in abundance, including the cocoanut, sandalwood, Kauri pine, breadfruit, sago palm, banana, sugar cane, coffee, maize, arrowroot and several kinds of forest fruits. The chief minerals are copper, iron and nickel. Trade is carried on for the most part with Sydney (New South Wales) and Numea (New Caledonia). The seat of government, Port Vila, is on the island of Efaté. The New Hebrides were named by Captain Cook, who visited them in 1774. See map, with article OCEANIA.



NEW JERSEY, *jur'zi,* a state of the Middle Atlantic group, popularly known as the GARDEN STATE, one of the thirteen original states of the American Union. Although there are only three states having a smaller area, New Jersey is among the foremost in manufacturing. The state is not only of industrial importance, but is also one of beautiful scenery, gardens and flowers, and is widely known for its ocean resorts. It has chosen the sugar-maple tree as its flower emblem.

Size and Location. The state is almost surrounded by water, as all but forty-eight miles of its boundaries are formed by natural waterways; these are the Delaware River and Delaware Bay on the west and south, the Hudson River on the northeast and the Atlantic Ocean on the east. Having an area of 8,224 square miles, of which 710 square miles are water surface, the state is about one-fourth of the size of Maine and ranks forty-fifth in area among the states of the Union.

The People. This small state, however, ranks tenth in population, its inhabitants numbering 3,155,900 in 1920. In 1910 the number was reported as 2,537,167. The density of the population, averaging about 420 per square mile, is exceeded in only the District of Columbia, Rhode Island and Massachusetts. Almost one-fourth of the inhabitants are of foreign birth, chiefly German, Italian, Russian and Irish, and the negro population numbers 91,273. There are many large cities and towns and over three-fourths of the population is urban. The cities with a population of over 50,000 are Newark, ranking fifteenth among the cities of the United States, Jersey City, the twentieth largest city of the Union, Paterson, Trenton (the capital), Camden, Elizabeth, Hoboken, Bayonne and Passaic, each of which is described under its title (see CITY, page 1393).

Of the religious bodies, the Roman Catholics are the most numerous, their number exceeding that of all of the Protestant bodies combined. The most prominent of these denominations are the Methodist, Presbyterian, Baptist, Episcopal and Dutch Reformed churches. In the early history of New Jersey, Calvinism had a large following among the Scotch, Dutch, English and French Huguenots, and in the western part of the state the Quakers held sway. After the Revolution the Methodist Church greatly increased in membership, but with the coming of the Italians, Germans and Irish in the middle of the nineteenth century, the Roman Catholic Church became predominant.

Education. The present township system of education, established in 1894, is administered by a state board of education, consisting of eight members, the commissioner of education and four assistant commissioners, and by county superintendents. Public schools are supported by the state educational fund, and by state, railroad and local taxes.

There is a compulsory education law, and in 1914 the total school enrolment was 534,511. The illiteracy of the state averages 5.6 per cent, the greatest part of which is among foreign-born whites. Industrial and agricultural instruction have been established in both elementary and high schools, a law passed in 1913 provides for vocational schools in cities and counties. Such schools have been established at Newark, Jersey City, Paterson, Bayonne, Passaic and Atlantic City. Another advanced step in education has been taken by New Jersey in the establishment of separate classes for the education of subnormal pupils.

Normal schools at Trenton, Montclair and Newark, the Newark Technical School, industrial schools at Hoboken and Trenton, an industrial school for the colored at Bordentown and a school for the deaf at Trenton are main-

OUTLINE MAP OF NEW JERSEY

Showing boundaries, principal rivers, chief cities, mineral deposits and the highest point of land in the state.

tained by the state. Of the many private academies for boys, several are famous; these include Peddie Institute at Hightstown; Lawrenceville School at Lawrenceville; Pennington Seminary in Mercer County; Blair Academy at Blairstown; Newark Academy at Newark; Bordentown Military Academy at Bordentown. There are also many private seminaries for girls. The most prominent institutions of higher education are Princeton University at Princeton, ranking among the greatest American universities; Rutgers College at New Brunswick; Stevens Institute of Technology at Hoboken. There are theological institutions at New Brunswick, Princeton, Madison and Newark. Up to 1916 New Jersey had no college for the higher education of women, but in that year funds were being raised for the establishment of a woman's college at New Brunswick to be affiliated with Rutgers College, and to provide training of the same high grade.

New Jersey has not yet adopted the plan of state supervision of charities. Institutions of charity and correction are controlled by separate boards appointed by the governor. The institutions for the dependent, defective and delinquent include hospitals for the insane at Morris Plains and Trenton; a home for the feeble-minded at Vineland; a home for epileptics at Skillman; a tuberculosis sanitarium at Glen Gardner; soldiers' homes at Kearny and Vineland. Correctional and penal institutions are a home for boys at Jamesburg; a reformatory at Rahway; a home for girls at Ewing; the state prison at Trenton. Prison contract labor is prohibited. Parental schools and juvenile courts are established in several counties. The state allows $200 a year to any blind person studying in an institution of higher education in New Jersey.

The Land. The northwest section of the state is crossed from northeast to southwest by parallel bands of rounded, wooded mountains, the loftiest being the Kittatinny Range rising from the banks of the Delaware. The narrow gorge known as the Delaware Water Gap, where the Delaware flows between forested mountains rising precipitously above the stream, is famous for the beauty of its scenery. The range reaches its highest point near the New York boundary, where High Knob rises 1,799 feet above sea level.

East of the Kittatinny Mountains the state is crossed by the "Highlands," a beautiful region of lofty, green hills, studded with sparkling lakes. These hills merge into the Piedmont plain, a rolling valley broken by ridges and isolated mountains, and falling gradually to the marshy meadows of the Hackensack Valley and the coast. Among the isolated ridges of this plain is the line of forest-crowned cliffs known as the Palisades, rising sheer from the waters of the Hudson, and forming a wall 200 to 550 feet in height.

The gently-rolling, coastal plain comprises the entire southern portion of the state. It is bordered by salt marshes, or meadows, and shallow lagoons enclosed by long, narrow sand beaches, such as Absecon Beach, upon which is built Atlantic City, the greatest municipal seashore resort in the world. Asbury Park, Ocean Grove, Long Branch and Cape May are other famous seaside resorts of the state. The entire coast is ragged and fringed with inlets and bays, the most important harbors being Newark and Raritan bays. Within the coastal plain is the "Pines," a sandy, fir-clad area extending from the famous health resort known as Lakewood to Cape May.

Rivers and Lakes. The western slopes of the Kittatinny Range are drained by the Delaware, but the streams of the greater part of the state flow east to the Atlantic. The largest of the coastal rivers are the Passaic and Hackensack

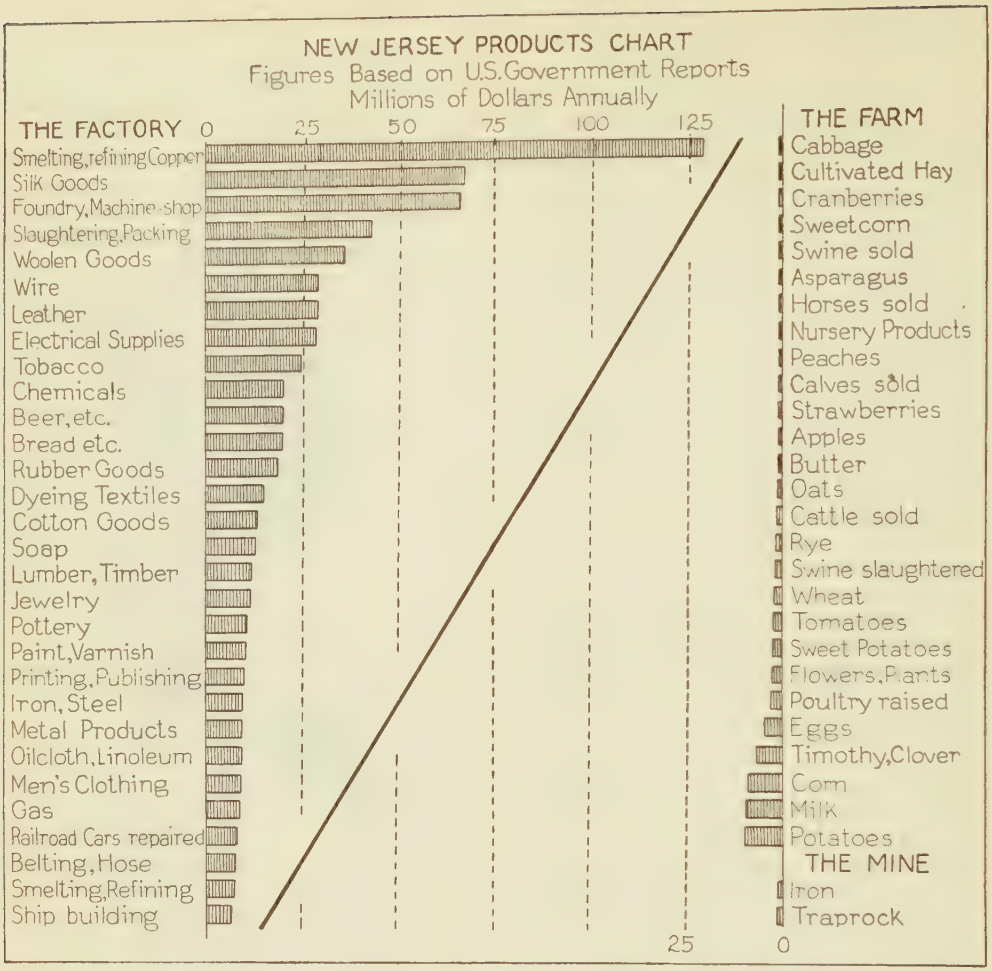
PHYSICAL MAP

The area in black represents the only parts of New Jersey which would remain above water if the whole state were 100 feet lower.

emptying into Newark Bay, the Raritan flowing into Raritan Bay, the Mullica and Great Egg rivers, flowing into coast lagoons, and the Maurice, draining the southern end of the state into Delaware Bay. These rivers are generally free from rapids and falls, except the Passaic, which drops fifty feet at Paterson, furnishing the vast water power used by the great silk mills of that city.

In the mountains and highlands there are many beautiful lakes, noted as summer resorts. The largest among these are Hopatcong, Greenwood, Macopin, Splitrock, Wawayanda, Green and Budd's.

Climate. The climate of New Jersey is mild, but there is considerable variation between the



northwestern mountains and the southern and eastern coastal lowlands. The annual temperature of Atlantic City is about 52° F. The mild, sunny winters of the evergreen section called "The Pines" have made it a popular winter resort, Lakewood having one of the most famous winter colonies in the East. The prevailing winds are continental, and the local sea breezes meeting the land winds often cause oppressive humidity along the coast. The annual rainfall averages forty-nine inches, the greater part falling in the mountainous region.

Agriculture. Possessing a mild climate, plentiful rainfall and a diversity of soils, New Jersey has occupied a distinctive position as an agricultural community. In 1920, more than one-half of the land area was in small farms. The western counties are the chief agricultural sections. The most important crops are hay, corn, potatoes, wheat, rye, oats, sweet potatoes and buckwheat. Orchard fruits of all kinds are sold in large quantities to near-by markets, and grapes are grown extensively through the northern section. New Jersey strawberries are of an especially fine variety. Huckleberries cover the mountain slopes and hillsides and blackberries also grow wild throughout the northern section of the state. In the bogs and lowlands of the coastal region, cranberries are successfully grown.

The proximity of large markets has made truck-farming important, and there are large gardens near New York and Philadelphia where quantities of vegetables, watermelons and cantaloupes are grown, the melons of the Hackensack variety rivaling those of Colorado. New Jersey ranks thirty-sixth among the states in the value of crops and is one of the leading states in the Union in the raising of flowers and plants. Dairying is important on the small farms in the highland and mountain regions.

The state aids agriculture through experiment stations, a board of agriculture and grange and horticultural societies. The forest lands in many sections suffer from neglect and have been decreased by fires.

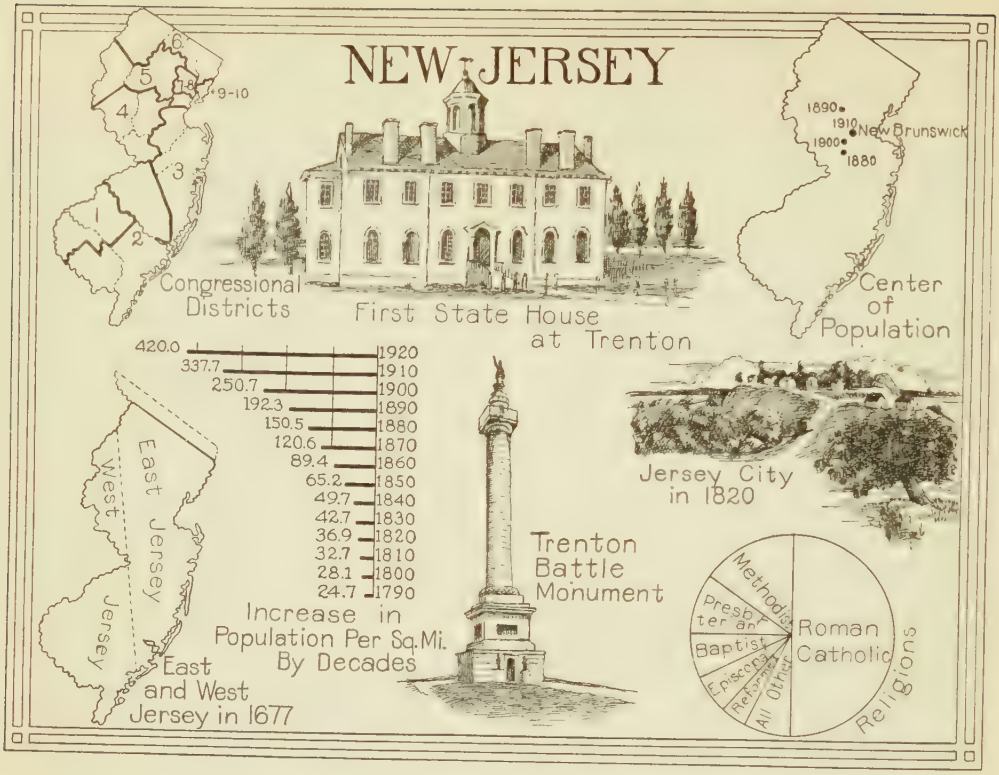
Fisheries. Extensive fishing grounds in the sheltered bays, shallow coast lagoons and tidal rivers and the proximity of large markets have made the fishing industry important. From the mouth of the Raritan to Sandy Hook and from Barnegat Bay to Cape May there are extensive oyster beds, and those of the Maurice River and Delaware Bay are famous. Clams, weakfish, bluefish, bass, shad and sturgeon are also caught in large quantities. The total annual value of the fisheries product is considerably more than $6,000,000; the capital invested in the industry is about $2,000,000.

Minerals. New Jersey owes its importance as a mineral state to its clay products, which include every variety of brick, tile and pottery produced in the United States. A vast amount of fire and ware clay is found at the mouth of the Raritan, and brick clays are found in thick beds along the Hackensack River. Clays for terra cotta are obtained near Trenton and Palmyra, and Mercer County is the center of the pottery industry. Fire sand, kaolin and feldspar are dug in the Raritan clay district. The zinc production of the New Jersey mines, chiefly Franklin Furnace, Sterling Hill and Mine Hill, is second only to the zinc output of Missouri. The manufacture of Portland cement ranks third among the mineral industries of the state and the production of molding sand and trap rock used in concrete and road building is also important. Granite is quarried at Charlottenburg and Pohuck Mountain, and sandstone, brownstone and slate are produced. The total value of the yearly mineral output of the state is about $10,000,000; of this amount clay products make up more than half, and Portland cement about one-tenth.

Manufactures. The excellent transportation and near-by markets of New York and Philadelphia have developed the great manufacturing industries of New Jersey, which are located chiefly on or near New York harbor or in the vicinity of Philadelphia. In 1915 New Jersey ranked sixth among the manufacturing states of the Union, and it is claimed that in the city of Newark there is made a wider variety of articles than in any other city of the United States. In the smelting and refining of copper and in the production of copper wire, New Jersey leads all of the states. Paterson surpasses all other cities in the United States in the manufacture of silks, and Passaic is noted for its production of woolen goods. Newark is famous for leather, jewelry, oilcloth and hats, and Jersey City for sugar refining, tobacco and soap products. Terra cotta, brick and tile are manufactured in great quantities at Perth Amboy, and Trenton is noted for pottery of all kinds, the state being surpassed only by Pennsylvania in the production of pottery, and ranking third among the states in all clay products. As the home of the Edison plants and other great electrical establishments, the city of Orange is famous. Bayonne has recently been prominent in the manufacture of arms and munitions. In all there were more than 11,000 factories in the little state in 1920.

Transportation. New Jersey is crossed by all railroads entering New York City from the West, and all lines enter Philadelphia from the East by way of Camden. All New York lines from the West, except the New York Central and the Pennsylvania, have terminals at Jersey City or Hoboken. There are over 2,460 miles of railroad within the state, the chief lines being the Pennsylvania; Central Railroad of New Jersey; Philadelphia & Reading; Delaware, Lackawanna & Western; Erie; New York, Susquehanna & Western; Lehigh Valley; New York Central & Hudson River. There are over 1,370 miles of electric railway track in the state and continuous service is afforded from New York to Philadelphia by way of Jersey City and Camden. Newark, Hoboken and Jersey City have subway service to New York. There are many urban and interurban lines, most of which are controlled by the Public Service Commission.

The water transportation is excellent on the Hudson and Delaware rivers, and the Delaware and Raritan Canal, extending from Bordentown to New Brunswick, and the Morris Canal, crossing the state from Phillipsburg to Jersey City, afford communication between the Delaware River and seaports. Newark has purchased 930 acres of swamp land fronting on Newark Bay for the purpose of improving and extending its harbor. At Bayonne, the Lehigh Valley Railroad is constructing a huge pier to handle ore brought from Chile, which is carried through the Delaware and Raritan Canal to Pennsylvania for the Bethlehem Steel Company. A seashore reclamation project for the redeeming of the swamps and meadows was begun in 1914. Over thirty per cent of the state roads are paved.



Government and History

The Government. The present and second constitution of New Jersey was adopted in 1844 and amended in 1875 and 1897. Amendments may be proposed in the senate or general assembly and must be adopted by two successive legislatures and by the people. They may not be submitted to popular vote oftener than once in five years. The question of woman suffrage was voted upon and defeated in 1915. All male citizens of the state residing one year and five months in the county in which elections are held have the right to vote. There are direct-primary elections for the President and all state officers.

The *legislative department* consists of a senate of twenty-one members, one from each county elected every three years, and a general assembly of sixty members elected each year and apportioned according to population. The legislature meets annually.

The *executive power* is vested in a governor, elected by the people for three years. A treasurer and comptroller are appointed by the legislature, and the secretary of state, attorney-general, prosecutors of pleas, clerks of the supreme and chancery courts and various commissioners, including the superintendent of public instruction, are appointed by the governor. The governor may not succeed himself.

The *judicial department* is unusually complicated. The highest court is the court of errors and appeals, consisting of the chancellor and justices of the supreme court and six other judges appointed for six years. Other courts are a court of chancery composed of the chancellor and eight vice-chancellors having terms of seven years; a court for the trial of impeachments; a prerogative court; a supreme court; circuit courts; inferior courts. The supreme court consists of a chief justice and eight associate justices appointed for eight years.

Local government is by counties, cities, townships and boroughs. Cities and towns are required to have local boards of health and may adopt the commission form of government. Child labor laws, employers' liability laws and antitrust acts have been passed. There are stringent laws regulating liquor traffic, but in 1915 municipalities were given the right to vote on the liquor question.

RESEARCH QUESTIONS ON NEW JERSEY

(An Outline suitable for New Jersey will be found with the article "State.")

What characteristic won for this state its popular name? What historical event is commemorated in its proper name?

Name three places which give this state the right to the title of the "Playground of America."

How many states of the Union are larger? How many of these have a larger population?

How extensive is the land boundary of the state? By what state is this land boundary formed?

If Illinois were as densely populated as is New Jersey, how many inhabitants would it have? Answer the same question for New York.

How many cities are there in the state which have a population as large as or larger than that of El Paso, Tex.?

In a gathering of one thousand people, who were representatives of all classes of the inhabitants, how many would be found who could not read or write?

How does the state care for the education of its blind?

Describe the Delaware Water Gap. How was it formed?

How many hills as lofty as New Jersey's greatest height would it take to reach the highest altitude of New Hampshire? Of Colorado?

What are the Palisades? In what other state are they to be found?

In what direction do most of the rivers flow? What is the chief power-producing river? What product do we owe to its power?

Explain the excess of moisture which sometimes is to be found in the coastal regions.

Why is the production of garden vegetables and small fruits so profitable in this state? What valuable products are obtained from apparently waste land in bogs and mountains?

What does the state do to help the farmer?

What very important manufacturing industries are based on the mineral production of the state?

How many states have more extensive manufactures? What distinction has Newark as an industrial city? In what industrial enterprises is New Jersey unsurpassed by any state?

Mention some very important things which the country receives from the industrial establishments of Orange.

Why does the state have such excellent transportation facilities? What is the railroad mileage to one hundred square miles of area?

How many constitutions has the state had? When was the present one adopted?

What legislation shows the progressive character of the state?

Who compared New Jersey to a "cider barrel tapped at both ends," and what did he mean by the comparison?

What educational institutions have existed in the state since before the Revolutionary War?

In what aspect of the treatment of the Indians was New Jersey a pioneer?

What part did the state play in the Revolution?

What was the "New Jersey Plan," and how did the state show its patriotism when this was rejected?

Settlement and Colonial Government. When the first settlement of white men in New Jersey was made by the Dutch in 1617, the territory was occupied by the Lenni-Lennape tribe of Algonquian Indians. Through the discovery and exploration of the Delaware River by Cornelius Mey, for whom Cape May was named, Holland claimed the territory. Farmers and traders from New Amsterdam settled in Hudson and Bergen counties and the influence of the Dutch Church and speech was deeply impressed upon the northeast section of the state. Groups of Swedes settled in the Delaware Valley near Philadelphia, but they submitted to the domination of the Dutch, who controlled the colony until 1664, when the territory was conquered by the English and granted to Lord Berkeley and Sir George Carteret. In recognition of Carteret's defense of the Island of Jersey, the grant was called New Jersey. A liberal government was established and many immigrants from New England settled in the colony. Carteret assumed control of the eastern section, or "East Jersey," and Berkeley disposed of his interests in the west to a company of Friends, who controlled "West Jersey" until both it and East Jersey passed under the control of the boards of proprietors.

In 1702 the Jerseys were reunited in a crown colony and the usual colonial quarrels between the people and the royal officers continued until independence was declared. The growth of New York and Philadelphia attracted many of the New Jersey colonists to those cities, and gave rise to Banjamin Franklin's famous remark that New Jersey was like a cider barrel tapped at both ends. Before the Revolution, Huguenots, Scotch and Irish had settled in the central and western parts of the colony, ferries and post roads had been built, Princeton University and Rutgers College had been founded and the first Indian reservation in America had been established in 1758 in Burlington County.

Independence and Statehood. The Revolution found the colony divided in sentiment, and a large number remaining loyal to England joined the Tory raiders known in the colony as the "Pine Robbers." On July 2, 1776, New Jersey issued a declaration of independence. During the Revolution, nearly one hundred battles were fought within the state, prominent among them being the battles of Trenton, Princeton, Red Bank, Monmouth, Paulus Hook and the engagements around Elizabeth and Newark. Washington's "retreat across the Jerseys" and winter occupation of Morristown are other noted events of the war. The state contributed over ten thousand men besides its militia to the Continental army, and its losses were especially severe.

In the Constitutional Convention, the New Jersey representatives offered the "New Jersey Plan," recommending a Union with little authority over the states, but they unanimously adopted the Federal Constitution on December 18, 1787. In the early nineteenth century, New Jersey was the center of the political struggle between partisans of the Federalist leader, Alexander Hamilton, and Aaron Burr, the advocate of state sovereignty, which culminated in the duel fought at Weehawken in which Hamilton was killed. During the War of 1812, the necessity for the overland transportation of troops led to the granting of the first railroad charter in the United States, and the Camden and Amboy Railroad and the Delaware and Raritan Ship Canal were constructed.

In the slavery struggle the state was generally Northern in sentiment and supported the Union army with its full quota of troops. New Jersey's greatest period of prosperity followed the war. Its cities grew with unprecedented rapidity, manufactures increased in importance and agricultural interests in the southern section of the state were developed. The chief issues in state politics have been those connected with taxation, the tariff and the control of corporations. In 1906 the great political power of the railroad corporations was broken.

The state has generally been Republican in national politics, but recently has had several Democratic governors and legislatures. In 1910, Woodrow Wilson, then president of Princeton University, was elected governor, and a Democratic majority was elected to the legislature. The administration of Governor Wilson was notable for many political reforms. In the Presidential election of 1912, Wilson carried the state by a large majority, and in 1916 the Republican candidate, Hughes, won the state. The Democratic legislature of 1913 passed measures advocated by President Wilson reforming jury selection.

E.B.P.

Consult Lee's *New Jersey as a Colony and as a State;* Stockton's *Stories of New Jersey.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New Jersey:

CITIES

Asbury Park
Atlantic City
Bayonne
Bloomfield
Bridgeton
Camden

East Orange
Elizabeth
Englewood
Garfield
Gloucester City
Hackensack
Harrison
Hoboken
Irvington
Jersey City
Kearny
Long Branch
Millville
Montclair
Morristown
Newark
New Brunswick
Orange
Passaic
Paterson
Perth Amboy
Phillipsburg
Plainfield
Rahway
Trenton

HISTORY

Monmouth, Battle of
Princeton, Battle of
Revolutionary War in America
Trenton, Battle of

LEADING PRODUCTS

Corn
Hay
Muskmelon
Oyster
Potato
Pottery
Silk
Strawberry

PHYSICAL FEATURES

Delaware
Delaware Water Gap
Palisades
Raritan
Sandy Hook

NEW LISKEARD, *lis'kard,* a town in Ontario, in the Timiskaming district, at the head of Lake Timiskaming and on the Timiskaming & Northern Ontario Railway. It is five miles north of Haileybury and ten miles north of Cobalt. Steamers run on the lake between New Liskeard and other points, and connect by a short line with the Canadian Pacific Railway at Mattawa. An electric railway runs to Haileybury. New Liskeard is important for its large sawmills, which are its largest industrial establishments, but it also has a gristmill and other manufacturing plants. The electric light and waterworks systems are owned by the town. Population in 1911, 2,108; in 1921 it had increased to 2,268.

NEW LONDON, Conn., a city on the west bank of the Thames River, about three miles from the Atlantic Ocean. It is in the southeastern part of the state and is one of the two county seats of New London County, thirteen miles south of Norwich, the other county seat, fifty-one miles east of New Haven, and 124 miles northeast of New York City. The population, which includes a number of Italians and Poles, was 19,659 in 1910 and 25,688 in 1920, a gain of about 31 per cent.

The harbor is one of the best on the Atlantic seaboard. A state appropriation of $1,000,000 has provided for wharves and docks (under construction in 1917 for transatlantic steamships. There is regular steamer service to New York and other ports. The city is on the New York, New Haven & Hartford Railroad, between New York and Boston, and is the terminus of the Central Vermont road. There are interurban lines to New Haven, Norwich and other cities. A great railroad drawbridge spans the Thames between New London and Groton Heights. At this place is Fort Griswold, an old fort of the War of Independence, and a United States naval station.

Buildings and Parks. The interesting features of the city include a Federal building; a customhouse built many years ago; the county courthouse, built in 1784; a public library; the New London County Historical Society and Library; two memorial hospitals; Hotel Griswold; the Hempstead House, one of the oldest houses in the state; the Old Town Mill, built about 1645 and still running, and the little schoolhouse where Nathan Hale once taught. There are two endowed high schools, one for boys and one for girls, and an endowed manual training and industrial school. Ocean Beach, with municipal bathhouses, Riverside, Williams, Memorial and other parks are attractive places. The city contains the Woman's College of Connecticut and the School of Instruction for the United States Revenue Cutter Service. Each year the Yale-Harvard boat race occurs on the Thames River, an event which attracts thousands of spectators.

Industry. Manufacturing is the principal industry of the city. There are large silk mills producing embroidery and spool silk, wash silks and dress silks of every kind, and satin linings. The annual output of one mill is valued at $4,000,000. In all there were in 1920 91 manufactories, employing 2,240 wage-earners. The capital invested was $9,719,000. The product in that year of high prices was worth $10,274,000. There are shipbuilding and repair yards. One of the best-known wrecking and salvage firms on the Atlantic coast keeps in close touch with marine disaster by means of wireless telegraphy.

History. New London was founded in 1646 by John Winthrop, the younger. It was first known by the Indian name of Nameaug, and the river was known as the Monhegin. Both names were changed in 1658 in honor of London and the Thames in England. Before the War of Independence New London was the center of an important whaling industry. In the fall of 1781, a British force commanded by Benedict Arnold destroyed the city and wharves, and at Fort Griswold executed eighty-four American soldiers, after a number of them had

surrendered. The place of the massacre is marked by Battle Monument. New London became a city in 1784. J.H.

Consult Caulkins' *History of New London.*

NEWMAN, JOHN HENRY (1801-1890), a notable English cardinal of the Roman Catholic Church, one of the foremost figures in the religious life of his time, but best remembered by all the world as the author of the great church hymn, *Lead, Kindly Light.*

CARDINAL NEWMAN
In giving *Lead, Kindly Light* to the Christian world he made his name imperishable.

He was born in London, studied at Trinity College, Oxford, and in 1822 was elected a fellow of Oriel College. From his childhood he had been deeply interested in religious matters, and in 1816 had experienced a definite conversion; and the natural thing was for him to enter the ministry of the Church of England. In 1824, therefore, he was ordained, becoming curate of Saint Clement's, Oxford. Four years later he was made vicar of Saint Mary's, Oxford, and in that position exercised great influence by reason of his masterly sermons. Originally a supporter of the evangelical, or Low Church, party, he gradually changed his views until, in 1830, he definitely broke with that branch and stood as an acknowledged High Churchman.

Became a Roman Catholic. In the "Oxford Movement" (which see) he was the recognized leader, about a third of the *Tracts for the Times* being from his pen; but, meanwhile, he had begun to doubt the position of the English Church, and to feel far less hostile toward Roman Catholicism. Convinced finally that the Roman Church was the true one, he resigned in 1843 from Saint Mary's, left Oxford, and two years later was admitted into the Roman Catholic Church. In 1846 he went to Rome and was ordained a priest and on his return to England settled near Birmingham, where he established the Congregation of the Oratory. Most of the rest of his life was spent in Birmingham, though from 1854 to 1858 he was rector to the Catholic University at Dublin. Through all these years he was constantly occupied with literary work, producing his famous *Apologia pro Vita Sua* in 1864 as a result of a controversy with Charles Kingsley. His other works include *Essay in Aid of a Grammar of Assent* and some beautiful verse, of which the *Dream of Gerontius* ranks highest. His best-known single poem is *Lead, Kindly Light,* which has been given added popularity by the exquisite music written for it. The words are as follows:

Lead, kindly light, amid the encircling gloom,
Lead thou me on;
The night is dark, and I am far from home;
Lead thou me on;
Keep thou my feet; I do not ask to see
The distant scene; one step enough for me.

I was not ever thus, nor prayed that thou
Shouldst lead me on;
I loved to choose and see my path, but now
Lead thou me on;
I loved the garish day, and, spite of fears,
Pride ruled my will: remember not past years.

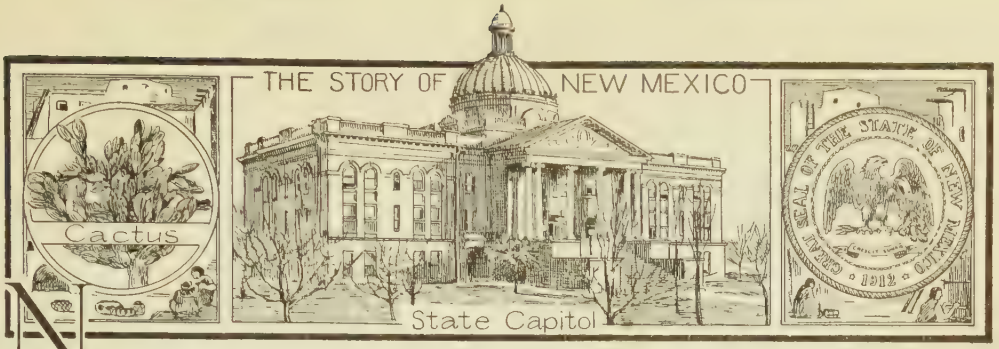
So long thy power hath blessed me, sure it still
Will lead me on
O'er moor and fen; o'er crag and torrent, till
The night is gone,
And with the morn those angel faces smile
Which I have loved long since, and lost the while.

Newman was created a cardinal in 1879 by Pope Leo XIII, but was permitted to live in England. His service to the Roman Catholic Church has been great, for he had dissipated many of the persistent prejudices against it. Men of all faiths admired and reverenced him, and the spiritual quality found in his works, no less than their delightful, elevated style, make them of continued interest to readers who are not especially concerned over the subjects which he discussed. A.MC C.

Consult Sarolea's *Cardinal Newman and His Influence on Religious Life and Thought;* Barry's *Newman.*

NEWMARKET, a town in Ontario, in York County, on the Holland River and the Grand Trunk Railway, thirty-four miles northwest of Toronto. It is a commercial center, and also has some manufacturing interests, among its products being flour, lumber, woodenware and canned goods. Population in 1911, 2,996; in 1921, 3,626.

NEW MECKLENBURG, an island in the Bismarck Archipelago, the second in size of the islands which comprise that group. A part of the German protectorate since 1885, it has been since shortly after the outbreak of the War of the Nations under British control. What will be its fate after the conclusion of peace it is impossible to conjecture.



NEW MEXICO, one of the rich mining states of the plateau at the south end of the Rocky Mountains, a state of the Southwestern group, and, with the exception of Arizona, the youngest of the United States.

Size and Location. But for the L-shaped section in the southwest corner of the state, west of the Rio Grande, New Mexico is almost a perfect square, lying on the Mexican frontier between Arizona and Texas. Only three states of the Union, Texas, California and Montana, are larger than New Mexico, which has an area of 122,634 square miles, of which 131 square miles are water surface. The state is less than half the size of Texas and ninety-eight times the area of Rhode Island.

The People. Although New Mexico ranks fourth in size among the states, there were, in 1920, only four states with fewer inhabitants. The population was then 360,350, much less than that of the District of Columbia, and averaging only 2.9 to the square mile. On January 1, 1910, the reported population was 327,-361. The inhabitants are of three classes, the English-speaking class, known as "Americans;" the Spanish-Americans, called "Mexicans," and the Indians. The inhabitants of Spanish descent still keep their racial peculiarities and language and the majority of them live in low adobe huts built around a court. Many of them have intermarried with the Indians, creating a class known as "Mestizos." There are 19,500 Navaho, Apache and Pueblo Indians living in the state reservations, Oklahoma and Arizona being the only states having a larger Indian population. The Pueblos live in adobe or stone houses, are usually self-supporting and have been converted to Christianity. The terraced architecture of their many-storied, communal dwellings is remarkable and shows a fairly-advanced state of civilization.

The proportion of Spanish-American and Indian inhabitants is steadily decreasing, and about one-tenth of these people now use the English language. The urban population is small and the only city having over 10,000 inhabitants is Albuquerque. The other principal cities are Santa Fe, the capital, and Las Vegas, in the center of the stock-raising district, important for its shipments of wool.

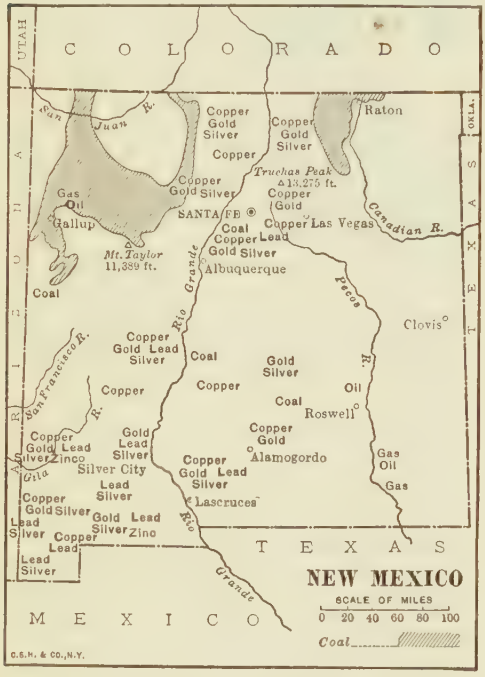
Owing to the large population of Mexican and Spanish origin, over three-fifths of the inhabitants are members of the Roman Catholic Church. The largest Protestant bodies are the Methodist, Presbyterian and Baptist denominations.

Education. The educational problem is unusually difficult in this state because of its widely scattered and mixed population. When New Mexico became a territory in 1848, there were 90,000 inhabitants who did not speak the English language. A school system was not organized for fifty years, the first school law being passed in 1891. Public education is now being rapidly extended, and the illiteracy, which in 1920 was 15.6 per cent, is decreasing. Elementary education is free, and a compulsory-education law has been passed, applying to all children between seven and fourteen years of age. The use of the English language is enforced in public schools.

Industrial education is supervised by a state director, and other public schools are administered by the state superintendent and local boards of education. Schools are supported by a state fund and taxes levied in each county, district and municipality. Normal colleges are maintained at Las Vegas and Silver City, and state institutions of higher education are the University of New Mexico at Albuquerque, a school of mines at Socorro and a college of agriculture and mechanical arts at Mesilla Park. There are twenty-six Indian schools maintained by the United States government, a military institute at Roswell and a number of missions and church schools.

State institutions of charity and correction are an asylum for the blind at Alamogordo; an insane hospital at Las Vegas; a reform school at Springer; a miners' hospital at Raton; the penitentiary at Santa Fe. These institutions are controlled by separate boards of directors. In 1915 a law was passed making the education of blind children compulsory.

The Land. New Mexico is a vast, elevated plain, sloping gradually south and southeast,



OUTLINE MAP OF NEW MEXICO

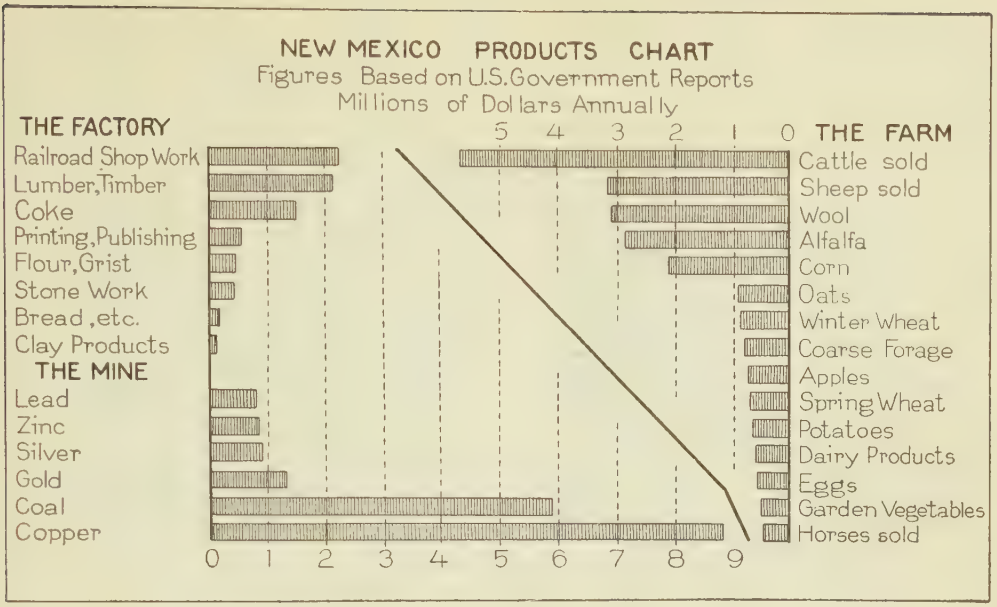
Showing the boundaries, principal rivers, chief cities, location of mineral deposits, coal and gas areas and the highest point of land in the state.

and broken by steep, rocky mountains and mesas. A level, arid section known as the Llano Estacado, or Staked Plain, lies in the southeast. It is separated from the foothills of the Front Range of the Rocky Mountains by the valley of the Pecos River, the only part of the state having an elevation of less than 3,000 feet. Near the center the northern boundary of New Mexico is penetrated by the Rocky Mountains, and the whole northern part is generally mountainous. There are very lofty peaks in this section, among them being Truchas, rising 13,275 feet above the sea, and Cerro Blanco, Taos, Costilla, Baldy, Lake and Mora peaks, all having an altitude of over 12,000 feet. Between the isolated mesas and groups of bare mountains of the Front Range, lie the grassy plains, or basins, called "bolsons" (purses) by the Spaniards.

The Rio Grande Valley crosses the state from north to south between the central mountains and the lofty plateau forming the Continental Divide. The table-land, scarred by deep valleys and studded with the high peaks of the parallel ranges of the Southern Rockies, extends across the state in a southwesterly direction. In the southern part of the state, covering an area of 300 square miles, there is a great basin of white sands in which many kinds of white reptiles and insects are found, this being a most interesting example of protective coloration. This is also the region of "alkali flats," lava beds and arid valleys where grow only the sagebrush, giant cactus and Spanish bayonet.

Rivers and Lakes. For a region of such scanty rainfall, rivers are numerous, and New Mexico has more streams than any other mining state of the Union. The small section of the state west of the Continental Divide is drained toward the Pacific by the San Juan, Rio Puerco, San Francisco, Little Colorado and Gila rivers. The Rio Grande, flowing the length of the state, and its tributary, the Rio Pecos, which meets it in Texas, are New Mexico's largest rivers, and drain the central section. Both of these rivers cut their way through deep canyons in the northern mountains but become sluggish in the southern plains. During the flood season, the Rio Grande usually inundates the lowlands and is often called the "Nile of New Mexico." It is fed by many tributaries rising in the Divide, the largest of these being the Chama and Jemez rivers. In the northeast corner of the state, the Canadian flows through rocky gorges and canyons, and extends into Oklahoma, where it joins the Arkansas River. There are many small streams which are lost in the sands. The waters of the temporary lakes, formed by melting snows, evaporate during the summer, leaving barren mud beds incrusted with salt.

Climate. New Mexico has only about twenty-three cloudy or rainy days a year. There are no extremes of heat or cold, but owing to the absorption and radiation of the sun's heat by the great sandy areas, there is a wide daily range in temperature. The average winter temperature is 35° F. and the mean summer temperature 71° F. The annual rainfall ranges from six inches in the southwestern valleys to thirty inches in the northern mountains. The snow accumulates to great depths on the mountain peaks and forms a steady source of water



supply for many of the rivers. There are usually two snows a year in the valleys, and these quickly disappear. Because of its mild, dry and invigorating climate, New Mexico has become a popular health resort, especially for those suffering from lung troubles.

Agriculture. The agriculture of the state is chiefly confined to the river valleys and irrigated sections. The great extent of semiarid plains covered with gama and salt grass affords abundant food for herds and flocks, and stock raising has been the most important branch of agriculture ever since the coming of the Spaniards. The raising of cattle is most important, but in the sheep industry New Mexico is fourth among the states, being surpassed only by Montana, Wyoming and Idaho. In 1916 the total value of the live stock of the state, as estimated by the United States Department of Agriculture, was approximately $120,000,000.

A little over one-seventh of the area of the state is in farms. Hay is the most important crop, followed by corn, wheat, oats, apples and potatoes. Kafir corn and maize, beans and other vegetables are grown, and a small amount of sorghum and sugar cane is cultivated. Taos Valley produces exceptionally fine wheat. In a large part of the irrigated land excellent fruit is grown; fine peaches, plums, apricots, pears and cherries are raised in the north and apples and quinces are cultivated extensively in the central districts. Grapes are grown throughout the state, and a few oranges and figs in some parts of the south. Berries of all sorts are also successfully raised, the strawberry being the most important.

The forests of the northwestern mountains produce most of the timber, which is principally pine. Groves of cedar, juniper and piñon cover the foothills, and cottonwoods, willows and box elders cling to the lowland streams. The cactus and the yucca, the roots of which are used as a substitute for soap, are abundant in the arid, southern valleys, and the former has been chosen as the state flower. In 1915 agricultural, viticultural (vine culture) and horticultural societies were established.

Irrigation. About two-fifths of the farms of the state are irrigated, the total acreage of artificially-watered lands, including projects under construction, being 1,102,291 acres. In 1915 the Hondo Reclamation Project was completed by the government, which is also constructing the Carlsbad and Rio Grande systems. The government has made a net investment of over $3,000,000 in the irrigating systems of New Mexico.

Mining. The mountains of New Mexico are rich in minerals, and since the earliest settlement of the territory, mining has been of chief importance. Coal deposits are widely distributed throughout the state, though Raton Field in Colfax County produces the greater part of the output. The fields of Santa Fe County and the adjoining deposits in Colorado are the only ones in the United States outside of Pennsylvania that produce anthracite, but their

combined output is less than 100,000 tons a year. Previous to 1912, coal was the chief mineral product of the state, but in that year great copper mines were opened in the Santa Rita district, and the value of the copper product, amounting to $9,000,000 a year, has since exceeded the value of the output of coal. Gold, silver and zinc are other important minerals, and lead, gypsum, iron ore, mica, clay, meerschaum, sand, gravel, salt, mineral waters, turquoise and other precious stones are produced. The value of the state's mineral products is about $18,000,000.

Manufactures. The manufacturing industries of New Mexico have not been extensively developed but they have increased in number and importance since 1890. With the exception of Wyoming, New Mexico is the least important manufacturing state in the Union. Car repairing and the lumber and timber and coke industries are most important. The extensive raising of sheep has developed large wool-scouring plants. In 1920 there were only 387 manufacturing industries in the state. They were capitalized at $15,226,000. The value of the product in that year of high prices was, $17,857,000.

Transportation. New Mexico is crossed by the trunk lines of several of the country's most important transcontinental railroads. The Atchison, Topeka & Santa Fe traverses the state from Colorado to Arizona. It has a branch following the valley of the Rio Grande southward and lines extending east and south to Texas and the Gulf of Mexico. The Southern Pacific extends through the state to the west coast. Other important lines are the Chicago, Rock Island & Pacific and the El Paso & Southwestern. Both of these latter roads have numerous spurs and crosslines, and railroad stations are reached by wagon roads from all small towns and settlements. In 1921 there were 3,000 miles of railroad and 1,200 miles of improved highway in the state. The "Santa Fe" owns almost half of the railway mileage.

Government and History

Government. New Mexico's first and only constitution was adopted in 1911. Amendments may be proposed in either house of the legislature, but before becoming a part of the constitution they must be accepted by a majority in both houses, and after being published for four consecutive weeks they must be adopted by the voters before the expiration of six months. Suffrage is extended to all male citizens residing in the state one year, in the county ninety days and thirty days in the precinct in which the elections are held. All candidates are nominated at primary elections, and bribery and corrupt political practices are punishable by fine or imprisonment. Women vote at school elections.

The *legislative department* consists of a senate of twenty-four members and a house of representatives of forty-nine members, meeting biennially. Senators are elected for four years and representatives have two-year terms. A modified form of referendum is in force.

The *executive department* consists of the governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of public lands; these are all elected for terms of two years and are not eligible to any state office for two after serving two consecutive terms. Since 1915 tax commissioners have been appointed.

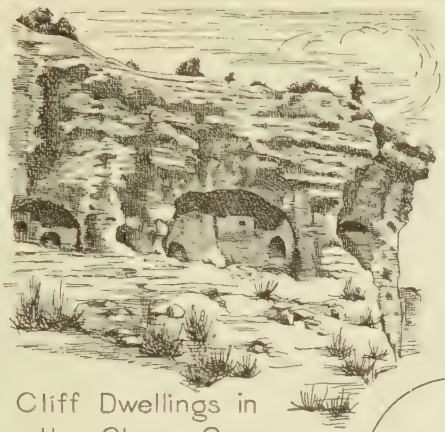
The *judicial department* consists of a supreme court having three justices, eight district courts, county probate courts, justices of the peace and such inferior courts as are established by law.

The usual forms of local government are cities, counties and townships. Cities may adopt the commission form of government. In November, 1917, state-wide prohibition was voted, to be effective in 1918.

A Spanish and a Mexican Province. New Mexico was the home of the famous Cliff Dwellers and Pueblo Indians, the most civilized and wealthy of American red men. The remains of their great prehistoric cities at Gran Quivira and El Moro and the cliff dwellings in the Mogollon Mountains are among the most notable historical antiquities preserved by the United States government. Stories of the great wealth of these Indians attracted Spanish explorers, and in 1598 Juan de Oñate conquered the Pueblos and established the first Spanish Colony. Before 1616 Santa Fe was founded. In spite of the severe attacks of the Apaches and Navahos, the white population slowly increased, many towns and missions were founded, and the mines were worked.

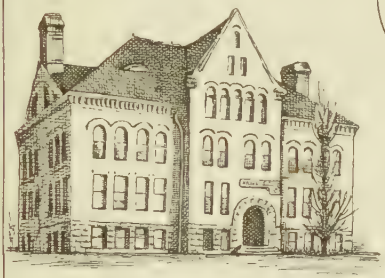
The territory became a province of Mexico when that country gained its independence from Spain in 1821. Early in the nineteenth century, American trade was established be-

NEW MEXICO

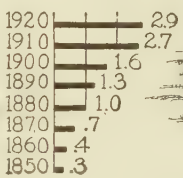


Cliff Dwellings in the Chaco Canon

Canon of the Brazos

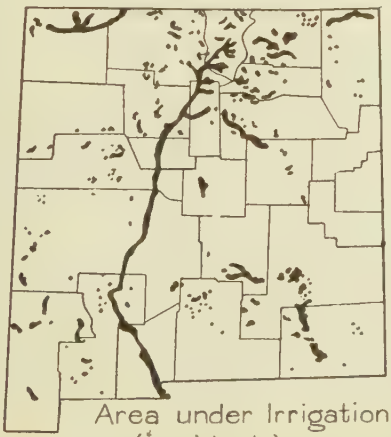


University of New Mexico at Albuquerque

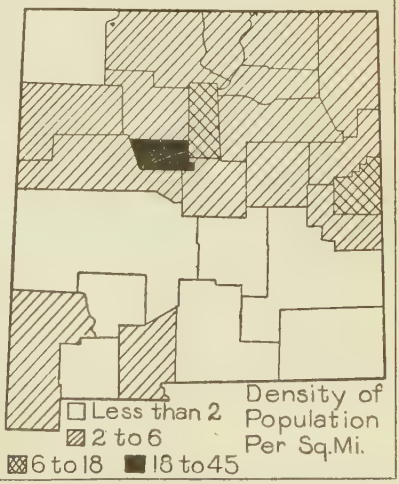


Population Per Sq. Mi. by Decades

Science Hall, College of Agriculture



Area under Irrigation (in black)



Density of Population Per Sq. Mi.

tween the province and the frontier settlements, especially with Kaskaskia, Ill., and with Franklin and Independence, Mo., and the famous "Santa Fe Trail" was opened for overland trade. In 1846, during the War with Mexico, United States troops under Kearny occupied Santa Fe, and by the Treaty of Guadalupe Hidalgo, February 2, 1848, the territory was added to the United States as a part of the Mexican cession.

As Territory and State. New Mexico was organized as a territory, September 9, 1850, the boundaries including parts of the present states of Arizona and Colorado. The territory was further extended in 1853 by the addition of the Gadsden Purchase. The formation of the Territory of Arizona in 1863 and the Territory of Colorado in 1867 greatly reduced New Mexico in size. During the War of Secession, the territory was invaded and occupied for a short time by the "Texas Rangers," troops of the Confederate army.

New Mexico made several attempts to gain admission to the Union. In 1901 an act of admission passed the House but did not reach a vote in the Senate. In 1906 Congress provided for the admission of Arizona and New Mexico as one state, if approved by a majority in each territory. The Arizona electors disapproved, and New Mexico remained a territory until 1912, when it was admitted as the forty-seventh state of the Union. In 1914 three amendments were added to the state constitution, one reducing the terms of state and county officers to two years, another allowing such officers to succeed themselves, and a third repealing the clause on taxation and eliminating the state board of equalization. New Mexico's first two governors were Democrats.

During the Mexican disturbances of 1915 and 1916 frequent border raids were made by the Mexicans, and in March, 1916, several American civilians and soldiers were killed at Columbus, in a raid led by Villa himself. As a result of this massacre, General Funston of the United States army ordered a punitive expedition under General Pershing to pursue the troops of Villa. The invasion of Mexico was begun and trouble with Carranza ensued, causing strained relations between Mexico and the United States (see MEXICO, subtitle *Government and History*). The state went democratic in 1916 and republican in 1920. E.B.P.

Consult Ladd's *The Story of New Mexico;* Bancroft's *Arizona and New Mexico.*

Research Questions on New Mexico

(An Outline suitable for New Mexico will be found with the article "State.")

What is a *mesa?*

Where and what is the Llano Estacado?

What are *bolsons,* and where are they found?

What is the loftiest point in the state? Is this higher or lower than the loftiest point in Colorado? Wyoming? Montana? Idaho? Nevada? Utah?

How many states are larger than New Mexico?

How many of the smaller states have a larger population? (See UNITED STATES.)

How many states the size of the smallest in the United States could be made from New Mexico?

How does the density of population compare with that of Arizona? With that of Nevada? With that of the country as a whole?

If the population of Philadelphia and that of New Mexico could be exchanged, how much more densely would the state be populated than it is at present?

Of what are most of the houses of the Spanish-Americans made?

Who are the *mestizos?*

How large a proportion of the population is composed of Indians?

Describe the interesting architecture of the Pueblo Indians (see PUEBLO).

What has determined the dominant religion of the state?

What accounts for the comparatively high percentage of illiteracy?

What very interesting example of protective coloration of animals is to be found in the southern part of the state?

What is the "Nile of New Mexico," and why is it so called?

About how large a proportion of the days are rainy or cloudy in New Mexico?

Why are the nights in this region so much cooler than the days?

How does it happen that so many of the rivers in this dry region maintain their flow throughout the year?

In what important branch of agriculture is New Mexico surpassed by only three states?

What is the railroad mileage to one hundred square miles of area?

How did this region come into the possession of the United States?

Related Subjects. The reader is referred to the following articles in these volumes for additional information in connection with the study of New Mexico:

CITIES

Albuquerque	Roswell
Las Vegas	Santa Fe
Raton	

HISTORY

Apache	Mexico, subhead
Cliff Dwellers	*History*
Gadsden Purchase	Navaho
Guadalupe Hidalgo	Pueblo

LEADING PRODUCTS

Cattle	Hay
Coal	Sheep
Copper	Wool

PHYSICAL FEATURES

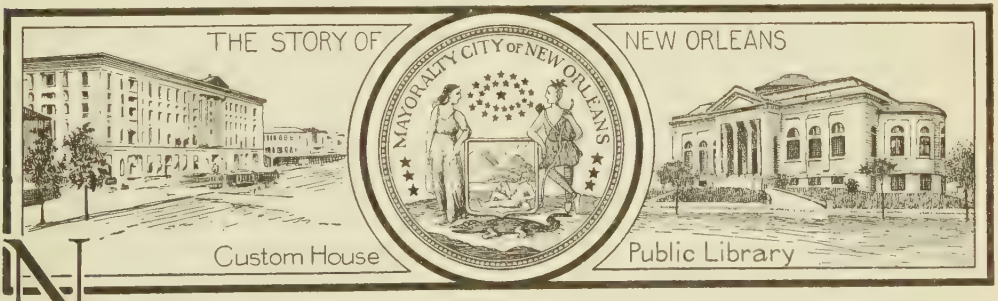
Gila	Rio Grande
Mesa	Rocky Mountains

NEW MEXICO, UNIVERSITY OF, located at Albuquerque, was established in 1889 by the territorial legislature as the future state university. The school, when opened in 1892, included a normal school and preparatory department. The following year a commercial school was added. Besides these departments the university now consists of a college of letters and arts, a college of science and engineering, a school of commerce, a school of music and art and a summer school. Nearly all of the university buildings are modified types of Pueblo Indian architecture, giving a pleasing and effective local touch. In connection with the university is the Hadley Climatological Laboratory, a school established to investigate the effect of high altitudes and dry climates upon disease. The University is located in a rapidly-growing, though thinly-settled, section of the state. The university instructors number about thirty-five, and the students about 575. The library contains 12,000 volumes.

NEW ORLEANS, BATTLE OF, a battle of the War of 1812, which would never have occurred had the telegraph and submarine cable been invented before it was fought. It took place on January 8, 1815, before word was received in America of the signing of the treaty of peace at Ghent, Belgium, on December 24, 1814, and is the only battle in history which was fought after the declaration of peace. The American forces in the South, consisting of 6,000 men, were commanded by General Andrew Jackson, and upon him fell the duty of defending the city of New Orleans. The army that came directly from Europe to take the city was 12,000 strong, and made up of some of the best soldiers that had defeated Napoleon's armies. Sir Edward Pakenham, commander of the British, began an unsuccessful cannonade of the American lines on New Year's Day. A week later he ordered a general assault.

The American defenses consisted of earthworks and cotton bales, behind which men and cannon were placed, and under the deadly fire which met them the British were driven back completely disheartened. Their loss was about 2,500 men and officers, but the American loss was very small. The battle had no effect on the outcome of the war, but indirectly it was of great importance. General Jackson's military genius and his spirited defense of the city made him the idol of the people and put him before the country as a Presidential candidate, while the battle itself gave the American government prestige in Europe. See WAR OF 1812; JACKSON, ANDREW.

Consult Smith's *Battle of New Orleans.*



NEW ORLEANS, *awr'le anz,* LA., the largest city of the Southern states in population, and, after New York, the greatest port in the Union for foreign and domestic commerce. It is the county seat of Orleans parish, and the city and parish are coextensive; the city is on the Mississippi River, 110 miles from its entrance into the Gulf of Mexico. Mobile, Ala., is 141 miles northeast; Saint Louis, Mo., is 639 miles north, and Chicago is 923 miles northeast, by rail. The following railroads meet here: the Illinois Central; Louisville & Nash-

ville; Texas & Pacific; Yazoo & Mississippi Valley; Queen & Crescent; Frisco Lines; New Orleans & Northeastern; New Orleans Southern and Grand Isle; New Orleans Great Northern; Louisiana Southern; Morgan's Louisiana & Texas (controlled by the Southern Pacific), and Louisiana Railway & Navigation Company.

Direct lines of steamers communicate with New York, the West Indies, Central America, Europe and the Orient. The route to the Orient was shortened about 8,500 miles by the Panama Canal. As New Orleans is a seaport, nearly all nationalities are represented among the people, with considerable French influence. The population increased from 339,075 in 1910 to 387,219 in 1920 (Federal census), making the city seventeenth in rank among the cities of the Union. Portions of the east bank of the river are the Fifth District and the fifteenth ward of New Orleans, and were formerly known as Algiers, though the legal title, before annexation to the city in 1870, was "Parish of Orleans, Right Bank."

Location. The city lies about ten feet below the level of the Gulf, and so far below the high-water level of the Mississippi River that levees, twenty feet high in some places, have been constructed to protect it from overflow. It occupies a strip of land between the river and Lake Pontchartrain, with which it is connected by two canals. Formerly the trend of the city followed the curve of the river, and consequently it became known as *The Crescent City,* but since the inhabited portion has been extended its shape more closely resembles the letter "S." Until recently, the problem of drainage and sewerage has been a difficult one, but by the expenditure of about $15,000,000 on the construction of pumping stations, the laying of many miles of sewer pipe, and the building of miles of canals, both of these systems have been made complete. Buildings may now be constructed with cellars, and the use of cypress piles and reënforced concrete in foundations has made the modern "skyscraper" possible for New Orleans. The waterworks plant, using water from the Mississippi River, is one of the largest of its kind in the world and one of the most efficient in the United States.

Description. New Orleans resembles a sort of pictorial book, which tells an historical story extending through many periods. There are the old Spanish and French quarters with their timeworn buildings and narrow, cobbled streets, and the busy, modern city which represents the best in architectural skill and construction. To visitors, the French Quarter, locally called *Vieux Carré,* is always interesting, though it is unsanitary and congested. Here are found nearly all of the historical buildings and landmarks—decadent old mansions with their odd latticed windows and courtyards, in a setting of semitropical vegetation; old-world antique shops, and famous old cafés, conducted by people who speak French almost exclusively. Here, too, may be seen *Old Absinthe House,* former headquarters of Jean Lafitte, the "patriot-pirate," and the *Haunted House* made famous by George W. Cable.

In strong contrast is the business section, with its modern office buildings, large department stores and handsome public buildings. This section forms the connecting link between the French Quarter and the Garden District, the latter the residential section of the wealth and the aristocracy of the Crescent City. This latter district is distinctly Southern in character; it has broad parkways and palatial homes, with wide verandas or galleries, set in bowers of luxuriant, semitropical foliage, fragrant jasmine and magnolia. Saint Charles Avenue in this locality is the chief residential boulevard. It is seven miles long and in some parts represents the highest art of the architect and the landscape gardener.

No description of New Orleans is complete without reference to its social life. The world-famous carnival, the Mardi Gras (which see); the French Grand Opera Company, an organization that was established forty years before the War of Secession; and also the horse racing, yet a most alluring sport, attracts throngs of visitors to the city during January and February. In 1917 a two-mile speedway was nearing completion, on 360 acres of land fronting on Lake Pontchartrain.

The parks of New Orleans occupy more than 700 acres; of these, Audubon Park and City Park are the largest and most interesting. Originally they were plantations; the latter was the scene of many duels and the former marked an epoch in the industrial life of the city, as here, in 1796, Etienne de Boré made the first successful attempt to granulate sugar. Jackson Square (formerly Place d'Armes) is one of the most beautiful public squares in the United States. It was the scene of the triumphal entry of General Jackson into the city after the Battle of New Orleans (which see) in 1815, and of the two transfers (in the Cabildo) of the province in 1803. Beauregard Square was the old-time resort of slaves. Other features of in-

terest are the French Market and the cemeteries, where the curious custom prevails of burying the dead in vaults rising in tiers above ground, since water was found almost immediately below before the drainage system was installed. Canal Street, the principal business street, is noted for its unusual width (200 feet).

Buildings. Among the buildings of historic interest are the Cabildo (the Spanish house of government), the Presbytery (the house of the Capuchin priests), the Saint Louis Cathedral, established in 1724, and one of the best-known churches in the United States; the Pontalba buildings, and the convent of the Ursuline Nuns, the oldest building in the city (1730). The new marble post office, completed at a cost of $3,000,000, and the beautiful city hall face Lafayette Square. Other notable buildings are the $2,000,000 white marble courthouse, the Cotton Exchange, the new Trans-Mississippi passenger station, the Hennen, Hibernia, Liverpool, London, Globe and Morris office buildings and some fine bank buildings. There are also many fine Roman Catholic, Protestant and Jewish places of worship.

Institutions. In addition to the eighty-seven elementary schools there are eight manual training schools and three business schools. For advanced education the city has Tulane University, with the H. Sophie Newcomb Memorial College for Women, the Loyola College for boys, and four colleges for colored students. Besides the Carnegie Library, with 100,000 volumes, the city has Howard Memorial Library, the Delgado Museum of Art and the Confederate Memorial, containing historical relics. The benevolent institutions include the charity hospital, one of the best-equipped institutions of its kind in the Union; Presbyterian Hospital and Hotel Dieu (Roman Catholic hospital); the Jewish institutions for the orphaned, the aged and the infirm; Roman Catholic asylums for orphans, infants and the friendless; the city homes for the aged, the infirm and the insane, and a refuge for boys. Kingsley House is modeled after the noted Hull House of Chicago.

Commerce and Industry. New Orleans is the southernmost gateway for the commerce of the greatest agricultural valley in the world, and millions of dollars have been expended in improving the port facilities, which are owned and controlled by the people. The jetties at the mouth of the river provide a channel of about thirty feet, and the river will harbor the largest vessels. There are about six miles of steel docks, affording berth space for more than

Questions on New Orleans

(An Outline suitable for use with New Orleans will be found with the article "City.")

After what famous naturalist, a native of Louisiana, was one of the parks of New Orleans named?

What invention or discovery, of great importance industrially, took place on the site of this park?

How many cities of the Southern states have a larger population?

What distinction does the city hold commercially?

What is the *Cabildo?* What is the oldest building in the city?

Which is farther from the city, Mobile or the mouth of the Mississippi?

Which is greater, the distance from Chicago to New Orleans or the distance from Chicago to New York?

What effect did the opening of the Panama Canal have on the city?

How has the fact that New Orleans is a seaport influenced the character of its population?

What does the name of the city tell you as to the nationality of its founders?

What town is within the corporate limits of New Orleans?

What is the ratio of the inhabited area to the total area?

What social institution in Chicago furnished the model for a similar one in New Orleans?

Why has it been necessary to build levees in some places along the Mississippi?

What is the popular name of the city, and why is it no longer strictly applicable?

How do the buildings of the city tell the story of its existence?

What is the *Vieux Carré,* and what would you find of interest there?

What building here was made famous by a well-known writer?

What is the Mardi Gras, and how is it celebrated?

What park is named for a President of the United States? What incident in his life took place here?

How do the cemeteries of New Orleans differ from those of most other cities? Why?

Name six articles of which New Orleans exports more than any other city in the United States.

Which is greater, the value of the annual exports and imports of New Orleans or the cost of the Panama Canal? How much?

fifty steamers from 400 to 500 feet in length. One of the largest floating dry docks in the world has been constructed here by the United States government. New Orleans is the largest market in the Union for cotton, sugar, molasses, coffee, rice, cigars, cigarettes, nitrate and bananas, and these products, with timber, are its leading exports. A new $20,000,000 canal in 1920 connected the city with the Gulf through Lake Pontchartrain, thus cutting out the long trip for ocean vessels down the river and past the jetties.

The government has recognized the strategic importance of this port by maintaining a large naval station here, and Jackson Barracks is the headquarters of the United States Coast Artillery. The Federal government also maintains here an excellent immigration station. As a manufacturing center, the city has the advantage of fine shipping facilities for raw material and for manufactured products; the Belt Railroad, owned by the city, is an important factor in its development. The leading industries are rice cleaning and sugar refining, one of the largest sugar-refining plants in the world being located here. In 1920 there were 873 manufactories, employing nearly 27,000 wage-earners. The capital invested was $125,-162,000. The value of the product in that year of abnormally high prices was close to $182,-800,000. The oyster and fish industries are also important. A United States mint was established here, but there has been no coinage since 1909.

History. New Orleans is the oldest settlement on the lower Mississippi River and is the oldest city in Louisiana with the exception of Natchitoches (settled in 1714). It was founded in 1718 by Jean Baptiste de Bienville, who named it in honor of the Duke of Orleans, regent of France. In 1722 it became the capital of French territory and in 1762 France ceded all of Louisiana to Spain. During the Revolutionary period, New Orleans was the headquarters of the Spanish forces in North America. In 1788 it suffered heavy loss by fire. In 1803 Louisiana was ceded by Spain to France and by France to the United States (see LOUISIANA PURCHASE). The incorporation of the city in 1805 was followed by a large increase in American population, and great impetus to its growth was given by the arrival of the first steamboat from Pittsburgh in 1812; by 1840 the population had increased to 102,000.

New Orleans was the state capital until 1849 (when the seat of government was transferred to Baton Rouge), and again from 1868 to 1880. During the War of Secession the city suffered severely, but after the reconstruction period its progress was uninterrupted. From 1832 until 1906 New Orleans was subject to epidemics of yellow fever, but in 1878 the United States Marine Hospital Service took charge of the city and the sum of $27,000 was raised to apply a system of killing mosquitoes to stamp out the plague. Water tanks and cisterns were screened and pools and ponds were oiled. The disease was finally conquered in 1906, and the people of the city believe it will never recur again. The rat-proofing campaign of the United States health department in 1914 destroyed many old, unsightly buildings. In 1912 the city adopted the commission form of government. J.M.G.

Consult King's *New Orleans: The Place and the People;* Gayarré's *History of Louisiana.*

NEW PHILADELPHIA, *fil a del' fi a,* OHIO, the county seat of Tuscarawas County, situated in the eastern part of the state, fifty miles northwest of Wheeling and about 100 miles south and east of Cleveland. It is on the Tuscarawas River, near the Ohio Canal, and is served by the Baltimore & Ohio and the Pennsylvania railroads and by an electric interurban line. The population in 1910 was 8,542; in 1920 it was 10,718, (25 per cent gain). The area of the city is nearly three square miles.

The city is in an agricultural and stock-raising country and in the vicinity are deposits of coal and iron ore and clay. The industries include mining, and the manufacture of iron and steel, woolen goods, roofing, tile and sewer pipe, pressed, stamped and enameled goods and vacuum cleaners.

New Philadelphia has Tuscora Park, containing twenty-five acres, a courthouse, public library, orphans' home, county poor farm and jail, and Union Hospital. The place was settled in 1805, incorporated as a village in 1815 and became a city in 1896.

NEWPORT, KY., former county seat of Campbell County, a favored suburb of Cincinnati, Ohio, situated in the extreme northern part of the state, at the junction of the Ohio and Licking rivers. These streams separate it from Cincinnati and from Covington, Ky., with which it is connected by bridges and an electric railroad. Newport is served by the Chesapeake & Ohio and the Louisville & Nashville railways. In 1910 the population was 30,309; by 1920 it had decreased to 29,317, a loss of about three per cent.

On the highlands, about three miles back of the city, is Fort Thomas, a United States military post. The notable buildings are the courthouse, city hall, post office, Masonic Temple and a public library. The city also has a park, and there are many handsome residences of Cincinnati business men. Although many of its people are employed in Cincinnati, its home industry is considerable, represented by 81 factories in 1920, employing 2,350 wage-earners. The capital invested was $14,807,000, and the value of the product was $16,935,000.

Newport was settled in 1791, was incorporated as a town in 1795 and as a city in 1850. It is now governed on the commission plan.

NEWPORT, R. I., the county seat of Newport County, best known as an exclusive resort of the wealthy. It occupies an area of six square miles at the southwestern extremity of the island of Rhode Island, in Narragansett Bay, about thirty miles southeast of Providence, the state capital, and seventy miles southwest of Boston. Railway service is provided by the New York, New Haven & Hartford Railroad, and there is regular steamboat connection with New York, Providence and other ports. In 1910 the population was 27,149; in 1920 it was 30,255.

Newport has a magnificent harbor, protected by Fort Greble and Fort Adams, which are used as a headquarters and base of the Atlantic fleet of the United States navy. On Goat Island, partly enclosing the inner harbor, is a United States torpedo station, and farther north, on Coaster Harbor Island, are a United States naval training station and a war college. Adjoining the harbor are the narrow streets and old-fashioned houses of the "Old Town," while the palatial summer residences of rich Americans are on the famous Cliff Walk, which winds along the cliffs on the east coast of the island for a distance of three miles. North of the Walk is Easton's Beach, admirable for sea bathing, and south of it is a private beach, the Bailey's. Among the interesting scenic features of the place and vicinity are Spouting Rock, Purgatory (a deep fissure in the rocks), and the picturesque Paradise and Hanging rocks.

Newport has many interesting historic associations. Its old State House, dating from 1743, was used as a hospital during the Revolutionary War, and is at present the seat of the county court. A Jewish synagogue, begun in 1762, is supposed to be the oldest Hebrew place of worship in the United States. Touro Park, along Bellevue Avenue, contains the old Stone Mill, or "Round Tower," mentioned by Longfellow in his *Skeleton in Armour.* Other interesting features are the William Ellery Channing House (1751), now used as a children's home; the Redwood Library, incorporated in 1747; Whitehall, built by Dean Berkeley in 1729 as his place of residence; Trinity Protestant Episcopal Church, dating from 1725; and the Sayer House, the headquarters of the British army in 1777.

Newer buildings include the Casino, a magnificent country club, a Federal building, erected in 1916; army and navy Y. M. C. A. building, the Newport Hospital, Saint George's School for Boys and the Townsend Industrial School. The Newport Historical Society has a valuable collection of relics and there are several libraries, public fountains, monuments, statues and parks. The city has considerable coastwise trade in fish, coal and general merchandise. Newport was founded in 1639; in 1784 it became a city but surrendered its charter in 1787. It was rechartered in 1853 and again in 1906. Until 1900 it was one of the capitals of Rhode Island. A.B.C.

NEWPORT NEWS, Va., famous for its shipbuilding industry, its shipyards being among the largest in the world. It is situated in Warwick County, on the north shore of the estuary of the James River, where it meets Hampton Roads. By water Old Point Comfort is nine miles north, and Norfolk fifteen miles southeast; Richmond is seventy-five miles northwest, by rail, and Washington, D. C., is 100 miles north and west, by water. The city is the terminus of the Chesapeake & Ohio Railway Company, and is one of the largest single railway terminals in the United States. Electric lines connect with Norfolk, Old Point Comfort, Hampton and Portsmouth. Newport News is one of the principal ports of the Southern states and has direct steamship connection with several home and European ports. In 1916 the population was 20,562; in 1920 it had increased to 35,596. The area of the city is nearly two square miles.

The fine harbor and exceptional shipping facilities of Newport News have in recent years made it the center of an extensive commerce; the value of the foreign trade in merchandise for a single year sometimes exceeds $72,000,000. The city ranks fourth in the United States in the shipment of grain. In its vast shipyards were built several United States battleships, many gunboats, cruisers, submarine and other seagoing craft; the Newport News Shipbuild-

ing and Dry Docks Company employs about 8,000 men. Three dry docks and the coal wharves are the most important industrial features, and there are in addition two grain elevators with a capacity of nearly 3,000,000 bushels, lumber mills, knitting mills and ironworks.

Newport News has a Federal building, a library and an aviation testing plant and training school. Features of interest in the city and vicinity are Casino Park, a popular resort; Warwick Park; Fort Monroe, a national cemetery, and Buckroe Beach, on which is located a national soldiers' home. In Hampton Roads, off Newport News, the United States fleet is frequently anchored, and there, in 1862, was fought the memorable battle between the *Monitor* and the *Merrimac*.

The first settlement at Newport News was made in 1621, but the city really has been built since 1882. In 1896 it was incorporated, and its name unites those of Christopher Newport, and English sea captain, and Sir William Newce, prominent in colonial days. J.B.L.

NEW RED SANDSTONE, the name of a rock formation of the Carboniferous Period. The rocks are loams, shales and sandstones, all of which are usually of a reddish-brown color. The system was given the name to distinguish it from the *Old Red Sandstone* of Europe. Some light red sandstones occur in Oklahoma, and beds of gypsum in various localities were formed at the same time. The system extends into the Triassic Period. The formations are more numerous in Europe than in America.

Related Subjects. The reader is referred to the following articles in these volumes:
Carboniferous Period — Old Red Sandstone
Geology (diagram) — Triassic System

NEW ROCHELLE, *ro shel'*, N. Y., in Westchester County, is a residential suburb northeast of New York City, sixteen and one-half miles from the Grand Central Station. It is on Long Island Sound and is served by regular steamers and by the New York, New Haven & Hartford and the New York, Westchester & Boston railroads. Electric lines connect with near-by towns, resorts and beaches. The population, which in 1910 was 28,867, was 36,213 (Federal census) in 1920. The area of the city is ten square miles.

New Rochelle has an excellent harbor and is one of the leading yachting centers on Long Island Sound. Prominent clubs include the New York Athletic, on Traverse Island; the New Rochelle Yacht, on Harrison Island; the Huguenot Yacht, the Rowing and the Wykagayle Golf. In the city are a number of fine colonial residences dating from the Dutch and English periods, a Federal building, courthouse, Carnegie Library, hospital, several noteworthy churches and a memorial home for the aged. City, Hudson and Neptune parks are attractive pleasure grounds. The New Rochelle College (Roman Catholic) occupies Leland Castle, a building noted for its fine interior decorations.

The principal industrial establishments include manufactories of druggists' scales, a large printing and publishing plant and a film corporation. Huguenot refugees from La Rochelle, France, settled here in 1688, and the settlement was named for their home city. The place was incorporated in 1847 and became a city in 1899. W.R.

NEW SIBERIA ISLANDS, a group of uninhabited islands in the Arctic Ocean, lying off the north coast of Siberia. They are interesting chiefly for their great deposits of the fossil remains of the mammoth (which see) and other animals, and of certain forms of vegetation. The islands are almost treeless, but they produce a typical Arctic plant life, which provides food for great numbers of lemmings and reindeer; bears and polar foxes, which feed on the lemmings, are also found. The group has long been a popular field for hunters. The principal islands of the New Siberia archipelago are Kotelnoi, New Siberia and Liakhov. The first named is the largest, 116 miles long and 100 miles wide, and contains the highest elevations.

NEW SOUTH WALES, the most populous state in the Australian Commonwealth and Great Britain's first colony on the island continent. Lying on the southeast coast, between Queensland and Victoria, it occupies a rectangular area of 310,372 square miles. It is more than twice the size of the state of California and larger than the combined areas of Alberta, Nova Scotia and New Brunswick.

The People. In its vast extent it had in 1921 2,103,836 inhabitants, including about 7,000 full-blooded aboriginals, of whom 2,000 are wholly or semicivilized. Over one-third of the entire population live in Sidney, the capital, which is a great modern city of about 897,640 inhabitants, resembling in its busy activities the commercial cities of America or Europe. Newcastle is the chief port for the northern part of the state; this city and its suburbs have a combined population of 62,900. Other important centers of trade are Balmain and Broken Hill, each having over 20,000 inhabitants; Newtown, Marrickville, Redfern, Paddington, Leichart

and Glebe, each having a population of over 10,000.

Among the religious bodies, the Episcopalians, or Anglicans, are most numerous. Other prominent denominations are the Roman Catholics, Presbyterians, Methodists, Congregationalists and Baptists. Many of the Asiatic inhabitants and aboriginals have been converted to Christianity, but the non-Christians, many of whom are Jews, number about 12,000.

Free education is provided for all from the kindergarten to the university, and school attendance is compulsory for all between the ages of six and fourteen years. The percentage of illiteracy is low. At the head of the educational system is the University of Sydney, with which a college for women is affiliated. There are also a technical college, Roman Catholic, Anglican and Presbyterian colleges and many private schools of various grades.

The Land. The rugged and broken coast rises precipitously from the sea and its rocky headlands shelter many good harbors, including Port Jackson, on which Sydney is located; Port Stephens and Port Hunter (on which Newcastle is located); Sussex Haven and Twofold, Jervis, Botany and Broken bays. A narrow strip of fertile land lies between the sea cliffs and the rough slopes of the Great Dividing Range, which extends across the state from north to south, nearly parallel to the coast. This irregular mountain system is broken into three minor ranges, that in the north being known as the New England Mountains, the central range being called the Blue Mountains and the Australian Alps forming the southern part of the system. These highlands, especially in the central region, are scarred by deep canyons and ravines, and their rugged peaks are separated by gorgelike valleys. The loftiest elevation in the state, Mount Kosciusko, lifts its snow-capped peak 7,350 feet above the sea. The western slopes of these ranges broaden into a rolling plateau which merges into the great arid grass-covered plains occupying the western part of the state.

The chief rivers are the Murray, which forms the greater part of the southern boundary; its tributaries, the Lachlan and the Darling; and the Murrumbidgee, an affluent of the latter. There are many other streams in the western plains, but most of them evaporate during the dry season. The eastern mountain slopes are the source of numerous small rivers and streams, many of which empty into large lagoons shut off from the sea by sand bars.

The climate of New South Wales is generally healthful, but the state, extending through many degrees of latitude and possessing a varied elevation, has climates ranging from that of the Northern United States to that of Central America, and from the dry heat of the western plains to the coolness of the damp coast regions. The temperature at Sydney is moderate and annually averages 63° F., but in the interior extremes of both cold and heat are known. The rainfall ranges from fifty inches on the coast to ten inches in the western plains.

LOCATION MAP

Position of New South Wales in Australia, and its size compared with the entire Commonwealth.

Industries. Grazing, the first industry of the colony, is still the chief source of wealth of New South Wales. The scarcity of water renders the western and larger part of the state unsuitable for agriculture, but the extensive grass-covered plains of this section afford excellent pasturage for sheep, cattle and horses. More sheep are raised in this state than in any other in the Commonwealth, which is the greatest wool-producing country in the world, and about one-half of Australia's total output of wool is produced by New South Wales.

The cultivated area is chiefly confined to the coast region and table-lands, but with the increasing use of irrigation it is being extended in the west, where the soil is productive when artificially watered. Over one-half of the tilled lands are devoted to wheat; hay, corn, green forage, oats, potatoes, tobacco and fruit, chiefly oranges, lemons and grapes, are other important crops.

The state is rich in mineral resources and the mining industry follows grazing in importance. The coal fields cover over 10,000 acres and annually produce more than 8,000,000 tons, sometimes over 10,000,000. The first gold produced in Australia was mined in New South Wales, where it was long the chief mineral product. Its production has declined in recent years and has been surpassed by the output of silver. Zinc is mined extensively in the silver district and copper of the richest quality, tin and iron are found in abundance. Lead, platinum and opals are other mineral products.

There has been a steady growth in the manufacturing interests, which are closely associated with the stock-raising and mining industries; the principal establishments include tanneries, woolen factories, soap and tallow works, foundries, machine shops and clothing factories.

Communication and Trade. The transportation in the more settled sections is good, and there are many miles of improved roads affording communication with the railroads throughout the state. Most of the railroad mileage, which amounts to over 4,000, and over 200 miles of electric car line are owned by the government.

Sydney is an important commercial port, exporting large quantities of wool, gold bullion, hides, skins, meats, wheat, coal and copper.

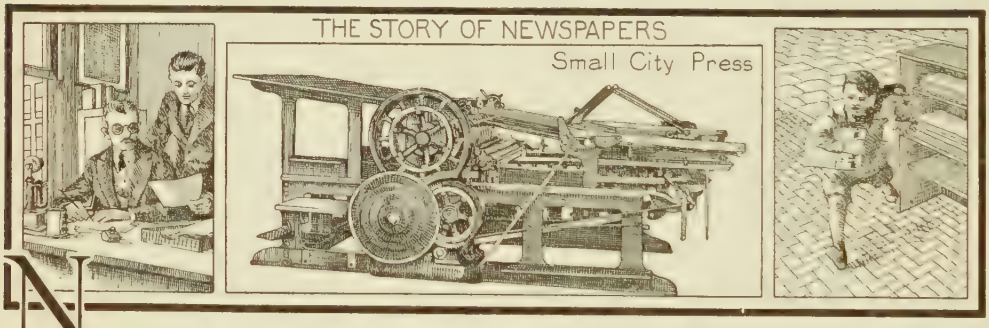
Government and History. The executive power is vested in a governor appointed by the Crown, and a responsible ministry. The law-making body is a parliament consisting of a legislative council of not less than twenty-one members appointed for life by the Crown, and a legislative assembly composed of ninety members elected by universal suffrage. Women have the same suffrage rights as men, and have voted since 1902.

New South Wales was discovered and named in 1770 by Captain Cook. The first settlement in Australia was the penal colony established at Botany Bay in 1788. Convict immigration ceased in 1840, and three years later representative government was established. The rather vague limits of the colony were changed with the erection of Victoria as a separate colony in 1850 and the separation of Queensland in 1859. The discovery of gold in 1851 caused a rapid growth in population and prosperity. In 1901 the colony was incorporated as one of the six original states in the Australian Commonwealth. See AUSTRALIA. G.G.

Consult Mills' *The Colonization of Australia;* Fitchett's *Australia in the Making.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New South Wales:

CITIES	
Newcastle	Sydney
LEADING PRODUCTS	
Cattle	Silver
Coal	Wheat
Horse	Wool
Sheep	Zinc
RIVERS	
Lachlan	Murrumbidgee
Murray	



NEWSPAPER, a periodical publication devoted to the circulation of news. The name is now generally applied only to those periodicals which appear daily, or, at the most, weekly. Many weekly periodicals, however, are grouped with those which are issued at longer intervals as magazines.

The modern newspaper is a powerful molder of public opinion, and in many ways the man who controls its policy takes the place of the orator of former times. Editors like John Delane of the London *Times,* Horace Greeley of the New York *Tribune,* Charles A. Dana of the New York *Sun,* to name only three outstanding men, exercised an influence which was scarcely second to that of the greatest statesmen of their day. Through the newspaper the editor reaches thousands of people who would be beyond reach of his voice.

As a molder of public opinion the modern newspaper deals with every subject from the best way to make bread to the proper way to run the business of a nation. The newspaper has a vast influence on public opinion as regards politics, religion and dozens of other problems. Every newspaper, too, has the opportunity to make itself a force for social betterment, for moral uplift, in its community. It need not thereby make itself the organ of a single movement; it can support the cause of

prohibition, or woman suffrage, or such apparently simple problems as clean streets and alleys, and at the same time be useful and interesting even to those who are not interested in, or those who are opposed to, the causes which it is championing.

Gathering and Publishing the News

Getting the News. If a newspaper is a small one, in a country town, its staff is necessarily limited. One man may do all that a dozen men do on a daily in New York or London. It is obvious that one man can get all the local news for a weekly paper in a town of 2,000 people, but it may take 500 men in a city of 2,000,000 people. On a large city paper the responsible head is usually the editor-in-chief. Below him is the managing editor, to whom the city editor, the sporting editor, the financial editor and the other department heads are responsible. Each department may have a number of *reporters,* who gather news items. The city editor has charge of the largest staff of reporters and is responsible for all local happenings.

A Reporter's Duties. Few people realize how systematically a reporter must follow events in order to prevent a rival from getting a "scoop," that is, a piece of news unknown to the first reporter. On a great paper certain reporters are assigned to routine work; for example, one keeps in touch with the police department, while another watches the court records. Important *assignments* are given to experienced men, and it is the ambition of almost every inexperienced "cub" reporter to become a "star" whose "stories" are placed on the first page. A visit from the President of the United States or a local happening tremendous in its consequences is a "story" for a star reporter.

News from All the World. There was a time when newspapers contained largely local matter, but the telephone, the telegraph, the wireless telegraph and the cable have altered this condition. A San Francisco or Vancouver paper publishes the news of an occurrence in London at about the same time that it is printed in a New York paper. All the largest papers keep correspondents in various parts of the world to report the most important events. Occasionally, as in war time, special correspondents will be sent to the front. But the great body of news comes through the Associated Press, or similar organizations, which lessen the burden of expense for the individual newspaper.

Editorial Writers. Besides the gatherers of news and those who put it into shape for publication, there are also a number of editorial writers. They comment on the occurrences of the day, offer advice for the future, and otherwise express the policy of the paper. As most newspapers are affiliated with some political party, or are recognized advocates of various public movements, it is the task of the editorial writer to convince his readers that his paper's viewpoint is the correct one.

Business Management. The reader of a newspaper must not forget that it is a business organization. Though a newspaper may have lofty ideals and may give all the news, it is not likely to be a success unless the owner makes a profit, or at least pays expenses. The first requisite of success from this point of view is a large number of readers. Some of the New York dailies have circulations of over 300,000, and at least one has an average of 600,000. One Chicago evening paper averages more than 480,000 copies sold daily. A cheap but brilliant Paris paper, *Le Petit Journal,* at one time had an average daily circulation of 1,250,000.

Distribution of Newspapers. The problem of delivering copies of a great daily paper to its thousands of readers is solved in a simple way. In a small city or town most of the paper's circulation is among regular subscribers, who pay for their paper at weekly, monthly or yearly rates and have them delivered at their homes or offices. The *carriers* are hired by the newspaper, and the subscription rate usually includes a small charge for the delivery service. In larger towns and cities subscribers may receive their papers in this way, but a vast number of readers buy their copies at news stands and pay for each copy when they buy it. From the printing office of the newspaper there is a steady stream of wagons and automobiles towards all parts of the city. These vehicles deliver parcels of newspapers to the various stands, distributing agents and railroad depots. The earliest issues of a metropolitan daily are rushed to the outlying sections and suburbs at the same time that they are placed on sale in the central district.

The delivery of metropolitan dailies to suburbs and near-by cities goes on at the same time that papers are being delivered at home. The New York business man who is visiting in Boston, Albany, Baltimore or Philadelphia may

sit down to breakfast with a New York daily before him. The paper was printed in New York, probably soon after midnight, was rushed to the railroad depot, where a fast train was waiting for it, and covered the 100 or 200 miles or more to its destination in a few hours. At the same time papers in smaller quantities are delivered to subscribers or dealers in more distant cities. Thus a newspaper printed in Chicago at 2 o'clock on Monday morning will reach New York early Tuesday morning.

Mechanical Development. Remarkable as has been the growth of the newspaper, nothing about it is more marvelous than the perfection of the mechanical processes by which it is made. From the single sheet, printed on a small hand press, it has developed to a modern 90-page Sunday newspaper. All the improvements in telegraph and telephone could not have brought this change, but improvements in printing made growth inevitable.

When the copy is ready, it is sent to the composing room, where it is set into type by the linotype. After proofs have been read the type is sent to the foundry, and stereotype plates are made from it in about ten minutes. The modern web rotary press, which does the printing, receives the paper from a large roll. The press prints both sides of the paper at the same time, and then, by various ingenious devices, cuts and folds the papers ready for distribution. The largest of these presses can print and fold 150,000 twelve-page papers in an hour. Such improvements, enabling a press to turn out hundreds of thousands of copies, when once only hundreds could be printed, is chiefly responsible for the decrease in the cost of the newspapers. So nearly perfect have the mechanical processes become that newspapers are frequently being sold on the street fifteen minutes after news of a great event has reached the editorial office.

Historical

The First Newspaper. The earliest attempts to circulate news were in ancient Rome, and in Peking, China. In Rome the *Daily Events* (*Acta Diurna*) was published from early days of the Empire until its fall in A.D. 476, and besides its general circulation, was used as a medium of communication between military officers and their armies. The Peking *News* (*Tsing-Pao*) is a monthly publication, founded early in the sixth century, for the purpose of making known the imperial edicts and other official news. Early in the seventh century the Peking *Gazette* appeared, and both of these Chinese papers are still published to-day.

Soon after the invention of printing, newspapers were circulated in Germany. They were small sheets, generally in the form of a letter. Some numbers still in existence contain accounts of the discovery of America, the surrender of Granada to Ferdinand and Isabella, and such local occurrences as earthquakes, executions and witch burnings. In the sixteenth century an official newspaper was issued in Venice, with accounts of battles and other matters of public interest. This paper was widely circulated throughout Europe, and originally sold for a small coin called a *gazzetta*. In time the paper was called *gazzetta* or *gazette*, a name which is still used. These little sheets, issued occasionally, had little in common with the great newspapers of to-day, with their great number of news items.

First European Papers. The earliest serial newspaper of modern style was printed in Germany in 1615, and was called *The Frankfort Journal*. The first English newspaper to appear regularly was "The Certaine News of the Present Week," edited by Nathaniel Butter in 1622. About the same time the London *Weekly Courant* appeared. The first known advertising in newspapers was in the *Commonwealth Murcurie*, in 1658. In 1665 the *Oxford Gazette* was published by the government while the Court was temporarily residing at Oxford on account of the London plague. It was later called the London *Gazette*, and has had an interrupted existence to the present time, as the English official organ for official announcements. It is published twice a week and contains proclamations, orders of council, promotions and appointments, and such orders and rules as are directed by act of Parliament. In 1785 appeared the London *Daily Universal Register*, which three years later changed its title to London *Times*. The success of the *Times* was largely due to the enterprise of its original promoter, John Walter, who introduced various improvements in the art of printing, and sought to secure the best literary talent for all departments of his paper. This has ever since been the great English daily newspaper.

In the United States. The first attempt to start a newspaper in colonial America was made in Boston, in 1690. The sheet was called *Pub-*

lick Occurrences, Both Foreign and Domestick, and was intended to be a monthly publication; but it was short-lived, for it printed some articles which sorely displeased the local authorities, and they suppressed it. The next attempt was in 1704, when the Boston *News-Letter* began a troubled existence of seventy-two years.

The first paper published outside of Boston was the *American Weekly Mercury,* of Philadelphia (1719). In 1721 James Franklin, assisted by his brother, Benjamin Franklin, started the *New England Courant,* which ran until 1727. In this latter year the *New England Weekly Journal* was first published, the earliest paper in America to print advertisements. It was a single sheet, measuring seven by thirteen inches. In 1729 Benjamin Franklin began, at Philadelphia, the Pennsylvania *Gazette,* which he conducted weekly until 1765, when it was merged with the *North American;* the latter is now one of Philadelphia's leading daily papers. The first New York newspaper was the *New York Gazette,* started in 1725 by William Bradford. At the outbreak of the Revolution, thirty-four newspapers were in circulation in the colonies, all but four of which supported the American cause.

In 1830 there began a rapid extension of journalism. It was no doubt due to the establishment of daily papers in New York, which almost at once became powerful. In 1833 the *Daily Sun* appeared—the first newspaper in the United States to sell for one cent. In 1868 this paper was taken over by Charles A. Dana, who gained for it a wide reputation. In 1835 James Gordon Bennett founded the *Herald,* and set the pace for exclusive foreign news, regardless of expense. In 1841 the *Tribune* of New York was born to the newspaper world; this alert, vigorous sheet is to this day in the minds of many a memorial of Horace Greeley, its founder and for thirty years its editor.

Not all of the early glory of newspaper achievement in the United States is due to the Eastern cities. In 1833, when Chicago had a population of 800, the Chicago *Democrat* was published weekly by John Calhoun, and was printed on paper which he had brought west with him. This paper appeared until 1861, when it was absorbed by the Chicago *Daily Tribune.* The *Tribune* began existence as an evening paper, July 10, 1847, and led a checkered career until 1855, when it came under the editorial supervision and general management of Joseph Medill, the friend of Abraham Lincoln and aptly called "the Nestor of the Illinois press." Under his management the *Tribune* became the most powerful publication in the Middle West, and its prestige steadily increased after his death; it is the second oldest daily in Illinois, the *Daily Journal* having been established in 1844. Another important Chicago paper, the *Daily News,* was founded in 1875 as a one-cent evening paper; in 1917 it was considered the second most profitable newspaper enterprise in America.

There are many other papers in the United States of more than local importance. Many of them, located in the smaller cities and towns, owe their fame to the achievements of a single able editor, but some have survived many generations. The best-known of these papers are the *Hartford* (Conn.) *Courant, Springfield* (Mass.) *Republican, Boston Transcript,* Philadelphia *Public Ledger,* Baltimore *Sun,* Cleveland *Leader* and *Plain Dealer,* Detroit *Free Press,* St. Louis *Globe-Democrat,* Kansas City *Star,* Atlanta *Constitution* and *Journal,* Louisville *Courier-Journal* and *Democrat,* Denver *Republican,* San Francisco *Chronicle,* and Portland *Oregonian.* The many papers owned by William Randolph Hearst include the New York *Journal,* the Chicago *American* and *Examiner,* the San Francisco *Examiner,* the Los Angeles *Examiner* and the Atlanta *Georgian.*

In the Dominion of Canada. In the establishment of newspapers Canada was not far behind the United States, for its first paper, the Halifax *Gazette,* was published early in 1751; it survived only about twenty years. In 1764 the Quebec *Gazette* was established, followed in the next year by the Montreal *Gazette.* For three-quarters of a century the Toronto *Globe,* a liberal organ, has played an important part in the history of the Dominion. The Montreal *Herald and Daily Telegraph* has been published without interruption for over a century. The *Star* of Toronto, although established as late as 1892, has earned a place among leading papers as a dignified and reliable sheet. The Manitoba *Free Press,* published in Winnipeg, holds the interest of the central provinces, and the *World,* of Vancouver, is among the leading organs in the far West.

Summary. It has been estimated there are now over 60,000 newspapers in the world, of which about 23,000 are published in the United States and 1,500 in Canada. Germany and Great Britain each have about 9,000, France nearly 7,000, Japan over 2,000, Italy and Austria-Hungary each about 1,500, and Australia over 1,000. W.F.Z.

Related Subjects. The following influential journalists are discussed in separate articles in these volumes:

Bennett, James Gordon	Howe, Joseph
Brisbane, Arthur	Howell, Clark
Brown, George	Macdonald, James A.
Bryan, William Jennings	Mackenzie, William L.
Carter-Cotton, Francis L.	Northcliffe, Lord
Dana, Charles A.	Pulitzer, Joseph
Garrison, William Lloyd	Robertson, John R.
Greeley, Horace	Rochefort, Victor H.
Hearst, William R.	Stead, William T.
Hincks, Sir Francis	Watterson, Henry
	Weed, Thurlow
	White, William Allen
	Willison, Sir John

NEWT, *nute,* a small animal with an elongated lizardlike body and four weak legs, related to the frog, toad and salamander, and with them classed among the amphibians (which see). Unlike frogs and toads, the adult newt has a tail. *Amphibia* is from a Greek word which means *capable of living in both air and water,* and a study of the life history of the newt shows why it belongs to this class. These little creatures hatch from eggs as tadpoles, and in this immature stage breathe by means of gills and live in the water. In the course of time they develop lungs and take to the land, though there are some species that remain in the water all their lives, never losing their gills. All newts are fond of moist, cool places. They cast their skins at various times, and are said to possess the power of reproducing lost limbs.

The best-known North American newt, found most numerously in the East, is the *red-spotted,* which grows to be four inches long. Its name refers to a row of vermilion spots on each side of its greenish-brown coat; below it is orange colored with black dots. Ditches and quiet waters are preferred by this newt, and it feeds greedily on all kinds of small water animals. The eggs are laid in the spring, on the leaves of submerged plants, and about two weeks after they are deposited the tadpoles, dull green in color, appear. In the course of their development their coat changes to a rich red, and they become dwellers of the woodlands, but by the spring of the fourth season they reach full maturity, don their original coat of green and return to the water to breed. In this stage they breathe through the skin, as then their lungs cease to function.

NEW TESTAMENT CHRONOLOGY. When the manuscript of the New Testament was prepared most of the various writers made no special attempt to assign dates to the events recorded. It has therefore been a more or less difficult problem for modern commentators to determine the time of such events as the beginning of Christ's ministry, the crucifixion, Paul's conversion, and so on. Some of the more interesting theories on the subject are given in the following paragraphs.

Events in the Life of Christ. Although the Christian Era is supposed to date from Christ's birth, through an early error in calculations that event and the era do not coincide. We know from the second chapter of *Matthew* that Christ was born in the reign of Herod the Great, who died 4 B. C. Christ's birth probably occurred two or three years before that date, in 6 or 7 B. C. The story of the Wise Men who followed the star has given rise to various speculations concerning unusual heavenly signs of that period. Kepler is authority for the statement that a conjunction of the planets Saturn and Jupiter could be seen in Palestine in the year 7 B. C. This statement strengthens the conclusion stated above.

The gospel according to *Luke* also confirms the theory that Christ was born about 7 B. C. In *Luke* II, 1-3, we read that the Emperor Augustus made a decree that all of his subjects should return to their legal homes to be enrolled for a census. From recently discovered papyri documents it is known that about the year 8 B. C. Augustus ordered a general census taken. It was therefore at this time that Joseph and Mary went to Bethlehem, where Christ was subsequently born. The selection of the twenty-fifth of December as the birthday of Jesus was, however, purely arbitrary. There is nothing upon which to base a supposition as to the exact day and month of the nativity.

At the beginning of Christ's ministry He had passed his thirtieth birthday, according to a statement in the third chapter of *Luke.* The Bible gives no other clue than this as to Christ's age when He began to preach.

The length of His ministry is judged only by inference, and is usually estimated to be about three years. In the gospel according to *John* three Passovers are mentioned, one spent at Jerusalem (II, 13), the second observed in Galilee (VI, 4), and the third occurring near the close of Christ's life (XII, 1).

The most definite statement as to the exact date of the beginning of Christ's ministry occurs in *Luke* III, 1-3, in which it is recorded that in the fifteenth year of Tiberius Caesar John the Baptist was called to preach repentance. Jesus was subsequently baptized by John, when the latter was at the height of his

career. The fifteenth year of Tiberius Caesar may be ascertained approximately. He succeeded Augustus in A. D. 14, but Luke may have reckoned the succession from A. D. 12 or 13, when Tiberius ruled in the East as associate emperor. The date of John's call to the ministry is therefore somewhere in the neighborhood of A. D. 26. As Jesus must have been baptized a few months later, He began to preach about A. D. 27. Any of the dates from 25 to 28 are possibilities.

It is stated in all of the gospels that Christ was crucified on Friday, and all but *John* assume it to be the day after the Passover. In the last gospel the crucifixion is said to have occurred on the day of the Passover. If the latter view is correct, Christ was crucified on the fourteenth day of Nisan. The general consensus of opinion is that the year of the crucifixion was either A. D. 29 or 30. The determination of this date is achieved by detailed calculations involving the Jewish calendar.

Speculations concerning the dates of events in Paul's life have also engaged the attention of scholars. As to his conversion, it followed the Pentecost, the organization of the Christian Church in Jerusalem, and the martyrdom of Stephen; that is, it probably occurred about A. D. 34. In *Acts* XI, 27-30, it is recorded that Paul and Barnabas brought food to the brethren in Jerusalem, because of an expected famine. This must have occurred about A. D. 45 or 46, as it was in the reign of Claudius Caesar (41-54), and there is historic record of a famine in Judea about A. D. 46. The first missionary journey of Paul soon followed, and took place in 47 or 48. Two other missionary journeys followed, and then came Paul's arrest in Jerusalem and his imprisonment by Felix, Roman governor of Judea. After two years Felix was succeeded by Festus, who permitted Paul to plead his cause before King Agrippa. These historic references enable scholars to fix approximately correct dates to several events in the apostle's life; he was probably in prison from between A. D. 56 and 58, and journeyed to Rome in 58 or 59. While in Rome he spent two years in prison (about 59-61), and while a prisoner wrote epistles to the Philippians, Colossians, Philemon and the Ephesians.

A subsequent missionary journey to Spain probably occurred about 61, and another imprisonment in Rome about the year 64. Tradition says that he suffered martyrdom under Nero, and if he perished with the Christians who were slaughtered to divert suspicion from the emperor at the time of the burning of Rome, he must have died about A. D. 65.

It will readily be seen that dates for New Testament events cannot as a rule be assigned with absolute certainty. It is possible, however, to infer the approximate time for a large number of important episodes in Bible history.

NEW TESTAMENT CRITICISM. Critical study of the New Testament is justified on the grounds that we possess no original copies of the sacred writings and that all modern versions are the results of compilation and translation. There are thousands of copies of New Testament writings extant, but these vary so widely that it is impossible to determine the exact form of the original manuscripts. There must be critical examination of the Biblical record to ascertain its spirit and meaning. Criticism is divided into two classes, *lower* and *higher*. Another term for the former is *textual*.

Lower Criticism. This concerns itself with the genuineness of the written record. Its chief aim is the determination of the correct form of every phrase used, and it entails a vast amount of research and comparison. As a result of many years of labor scholars have compiled a large number of variants for every verse in the New Testament. There are already over twenty different readings for each verse, but even so, the substance of the material has not been materially affected. In most cases the verse may read a number of different ways but still convey the same meaning.

Higher Criticism. This is broader in scope than textual criticism, and may be compared to what is known as literary criticism in the field of secular writings. The higher critic studies the sacred record to determine its reliability, authenticity and literary form, and he draws conclusions by a consideration of the author's style, references to historical events, allusions to contemporary manners, customs and ideals, etc. This method of criticism makes use of internal evidence. External evidence is also brought to bear on the subject. Comparison is made with other literary works of the period, and religious and political conditions of the time are studied.

Higher criticism fails of its purpose when the investigator takes up his study with a prejudiced mind. A man who makes a study of the miracles, for example, cannot hope to give an impartial verdict if he begins with a settled conviction that the miracles did not occur. Inconsistency, a tendency to read into the record that which is in the critic's mind, and far-

fetched interpretations are other charges made against higher critics.

Because of the manifest unfairness of some of the higher critics, advanced methods of New Testament interpretation have met with bitter hostility. The general movement, however, ought not to be hastily condemned, for wise and unprejudiced study of the life of Christ and the work of the apostles has brought many good results. The tendency of the more advanced theological schools is to teach the New Testament in the light of all that modern progress has taught. Sincere and devout investigators have found that they can study the Biblical record with open minds without having their faith undermined, and the churches are gradually coming to appreciate the necessity of Biblical criticism in its truest and best sense. In thus responding to the liberal tendencies of the age they have strengthened their hold on the young people of the colleges and universities.

NEW THOUGHT, a form of idealistic philosophy that received wide attention early in the twentieth century. It is a revival of some of the theories advanced by Emerson and his followers, and affirms the superiority of the mind over material conditions and circumstances. In the emphasis it places on the spiritual law New Thought is akin to Christian Science, but its adherents do not deny the existence of matter. If the central idea of the philosophy can be expressed so briefly, it is best condensed into the phrase, "As a man thinketh in his heart, so is he." New Thought advocates believe that the sick may be cured through mental treatment, and that the law of mind control should be applied to other problems. They consistently exalt the spiritual over the material, the life within over the world of sense. There is no definite organization, but a number of periodicals devoted to the New Thought principles are in circulation, and books and pamphlets on the subject are constantly increasing. No exact figures as to the number of New Thought adherents are available, but undoubtedly many who accept or are in sympathy with the philosophy are affiliated with the various churches.

NEWTON, Sir Isaac (1642-1727), an English mathematician, astronomer and natural philosopher, famed as the discoverer of many important laws in science, but honored chiefly because he formulated and made known the principle of universal gravitation (see Gravitation). This is one of the most important achievements in the whole history of natural science. Newton was born on Christmas Day, 1642, at Woolsthorpe in Lincolnshire. During his grammar school days, spent in the neighboring town of Grantham, he was much more interested in fashioning ingenious devices of a mechanical nature than he was in studying his lessons, and, according to his own account, he was considered a very poor student.

Nature and Nature's laws lay
hid in night;
God said, "Let Newton be!"
and all was light.
—Pope.

Among his boyish inventions were a small windmill that would grind wheat and corn, a water clock run by dropping water instead of by wheels, and a sundial which may be seen to this day, on the wall of the house where he was born. At Trinity College, Cambridge, however, to which he was admitted in 1661, he made a brilliant record in mathematics.

Early in 1665 Newton received his degree of B. A. He was then beginning to do original work, and during the next two years announced his discovery of the binominal theorem, the method of tangents and other important mathematical principles. It is believed, too, that at this period he began his investigations on the subject of universal gravitation. Though some authorities reject the familiar story of the falling apple, whose downward movement suggested to him the law that all particles of matter in the universe exert an attraction on one another, yet it is accepted by many as authentic and entirely reasonable. It was several years, however, before the laws of gravitation could be fully worked out and demonstrated by him. His contributions to the theory of light were hardly of less importance. By admitting a beam of sunlight through a small aperture into a darkened room, so that the beam passed through a prism, he showed that white light is a combination of the seven rainbow colors (see Light; Spectrum Analysis; Color). In 1704 he published, under the title *Opticks,* the results of his experiments and studies in color and light. He also made an exhaustive study of the reflecting telescope, so useful to him in his investigations, and he succeeded in constructing a type of instrument that has been of great value to astronomers.

Newton's election to membership in the Royal Society in 1672 showed the esteem in which he was held. In 1669, four years after his graduation, he had been appointed professor of mathematics at Cambridge. After the flight of James II he became a member of the Convention Parliament, holding his seat until the assembly was dissolved, in 1690. In 1696 he became Warden of the Mint, and three years later was appointed Master of the Mint, continuing in the latter office until his death. He was again elected to Parliament in 1701, this time representing the University of Cambridge, and during the last twenty-four years of his life was president of the Royal Society. In 1705 he was knighted by Queen Anne. He died on March 20, 1727, and was buried in Westminster Abbey, where so many of England's famous sons rest. Newton's greatest work, which established the fundamental laws of modern physics, is the *Principia Mathematica* (Mathematical Principles).

Consult DeMorgan's *Essays on the Life and Work of Newton.*

NEWTON, Mass., a city of Middlesex County, on the Charles River, situated seven miles west of Boston, of which it is a residential suburb. The New York, New Haven & Hartford and the Boston & Albany railroads serve the city, and electric lines connect with adjacent towns. According to the Federal census, the population in 1910 was 39,806; in 1920 it was 46,054 (Federal census). The city's area is more than seventeen square miles, and within its limits are Newton Center, Newton Lower Falls, Newton Upper Falls, Newtonville, Auburndale, West Newton, Newton Highlands, Chestnut Hill and several other small towns. Newton is one of Boston's most beautiful suburbs. More than 300 acres are included in the park reservations, a part of the Charles River Reservation of the Metropolitan Park system being within the city limits. For its size it is one of the wealthiest cities in the United States, and is the residence of a great number of Boston merchants.

In addition to its public schools, Newton has Mount Ida and Lasell seminaries, two schools for girls; Boston College, which occupies a beautiful site in Chestnut Hill; Newton Theological Institution, the first Baptist Theological Seminary in America (1825); Allen School for Boys; Saint John's Industrial School (for boys), and a public library with about 62,000 volumes. Its most notable buildings are its many handsome churches. Though Newton is primarily a residential city it is actively engaged in manufacture, the Charles River furnishing abundant power for this purpose. There were 48 factories in the city in 1920, employing $9,216,000 capital. The product was worth $14,389,000, at that year's high prices.

In 1630 the first settlement was made as a part of Cambridge (Newtowne). It was incorporated as a separate town in 1688 under the name of New Cambridge, which it retained until 1692; the city charter was granted in 1873. A part of Boston was annexed in 1875, and there have been several more recent adjustments of boundary lines. Features of historical interest are the Eliot Memorial, near the site of Waban's wigwam, where, in October, 1646, John Eliot preached to the Indians; Norumbega Tower, which marks the spot where the Norsemen were supposed to have landed; and the home of Samuel Francis Smith, composer of *America* and several missionary hymns. H.M.

NEW WESTMIN'STER, a city in British Columbia, except Vancouver and Victoria the largest city in the province. It is situated on the north bank of the Fraser River, about sixteen miles from its mouth. It is fourteen miles southeast of Vancouver by rail and about sixty miles directly northeast of Victoria. The city is served by the Canadian Pacific, Canadian Northern and Great Northern railways and the British Columbia Electric line, the last extending from Vancouver to Chilliwack. Population in 1911, 13,199; in 1921, 14,495.

New Westminster is well located both for water and for rail transportation. The Fraser River at this point is about a mile wide and is deep enough to accommodate ocean-going vessels. Large ships, in fact, may ascend five miles above the city, and smaller ones may go eighty-five miles farther. The harbor is large, and there is ample wharfage on both sides of the river. The city is the only fresh-water port in Western Canada. The railway service, too, is excellent, and is to a large degree responsible for the development of the city.

While transportation facilities have helped the city to grow, two industries, fishing and lumbering, have made it profitable to provide those facilities. The salmon fisheries of the Fraser River are world famous, and in or near New Westminster are about forty salmon canneries, probably the greatest aggregation of such plants in the world. New Westminster also has a number of lumber mills, one of which, with a daily capacity of 400,000 board feet, is said to be the largest in the Dominion.

Other large industrial establishments are saw and shingle mills, box factories, machine shops, car shops, creameries, a fruit cannery, shipbuilding yards and munitions factories.

Conspicuous features of the city are the public hospital, erected at a cost of $200,000; the high school, the Carnegie Public Library and the Westminster Trust block. As the capital of the electoral district of the same name, it has the government buildings, including the courthouse and the Indian and fisheries office. A penitentiary and provincial asylum for the insane are also located in the city.

New Westminster was founded in 1859, and until 1866, when the colony of Vancouver Island was joined to British Columbia, it was the capital of the colony on the mainland. It was named by Queen Victoria in honor of the ancient city of Westminster, now considered a part of London. Thus it doubly deserves the popular name, the *Royal City,* which is given to it. It was incorporated as a city in 1872, and remained the largest settlement on the mainland of British Columbia until the rapid growth of Vancouver, founded in 1885, deprived it of this honor. In 1898 New Westminster suffered from a fire which destroyed the business district. W.B.

NEW YEAR, the first day of the calendar year, celebrated in all civilized countries by religious observances, often preceded or followed by festivities. The custom widely prevailed even among the earliest of the ancient nations. The Chinese, the Egyptians, the Jews, the Romans and the Mohammedans, though observing different days as the commencement of the year, all marked them with elaborate ceremonies. In ancient Rome, where the year began in March, the day was sacred to Janus, whose two faces were typical of the attitude of the people toward a day which gave cause for reflection on the past and thought for the future. Presents were exchanged, and during the Empire the custom of giving to the emperor became so general that the entire populace brought presents and wished him good fortune. The former simple branches of bay and palm gave way to elaborate and costly presents.

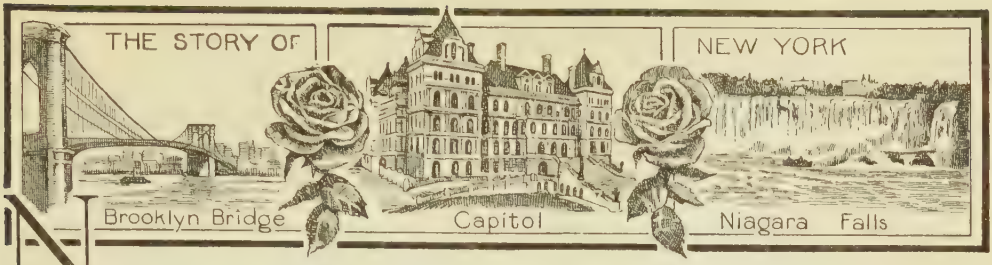
Among the Druids, the priests cut down branches of the sacred mistletoe on New Year's Day, March 10 in their calendar. After this ceremony they feasted and offered sacrifices. The Christian Church from the beginning has observed the first day of the year. The early fathers forbade any festivities, because of their pagan associations, but these prohibitions were eventually ignored. Christmas Day, Easter Day, March 1 and March 25, the Feast of Annunciation, have all been celebrated at various times and in various countries as the opening of the new year, and it is only since the sixteenth century, when the Gregorian Calendar was adopted, that January 1 has become generally recognized as New Year's Day. In Russia, Greece, and the other countries which retain the Julian Calendar, New Year's Day is twelve days later, on January 13. In many countries, New Year's Day is the occasion of visits. The Jewish New Year, Yom Kippur, is on October 12.

Formerly in the United States New Year's Day was a day set apart for formal calls, but the custom has declined greatly.

New Year's Program

Ring out the old, ring in the new,
Ring, happy bells, across the snow;
The year is going, let him go;
Ring out the false, ring in the true.
—*Tennyson.*

Song, *The New Year*.....*Tennyson*
Threshhold of the New Year....*Selected*
(From *Poetry of the Seasons*)
Essay, *On Good Resolutions*
Original Exercise, *Dialogue between the Old Year and the New*
Song, *Excelsior*.....*Longfellow*
Essay, *Looking Forward*
Farewell to the Old Year.....*Doudney*
(From *Poetry of the Seasons*)
Skating .....*Wordsworth*
Song, *Jingle Bells*
Original Exercise, *The Messages of the Months*
Quotations .....*Selected*
Tableaux representing historical events of January (see page 5112)
Song, *America*



NEW YORK, one of the Middle Atlantic states of the American Union and one of the original thirteen states. It was named in honor of the Duke of York, to whom it was granted in 1664 by Charles II of England. Before that time it had been called New Netherland. New York has been nicknamed the EMPIRE STATE—not that it is the largest of the states, for twenty-eight of them are larger, but for other elements which give it imposing rank. It is bountifully supplied with natural resources, and it is first among the states in population, manufactures, commerce and wealth; it has held this rank for nearly a century.

Its principal city, which possesses one of the most magnificent natural harbors in the world, is situated practically on the Atlantic Ocean. It has become the country's chief gateway on the eastern coast, through which the tide of immigration has flowed into the United States and through which a great amount of the produce exchanged between the United States and the rest of the world passes. It is small wonder that New York City has grown into the greatest city on the American continent.

In the days of colonization the town of New York, first settled by the Dutch as New Amsterdam, was the center of influence in the northern zone. Coming into the possession of the English in the year named above, the town and colony assumed additional prestige. The city was the first capital of the country under the new Constitution, and thereafter Philadelphia ceased to occupy the political place of first importance. Contributing to the supremacy of New York City and state was the Erie Canal, completed in 1825. New York then became the greatest gateway in America for incoming and outgoing commerce. For many years the state was pivotal in Presidential elections, but it is no longer true that "as New York goes so goes the nation." As the nation's financial center, New York City eclipsed Philadelphia before 1840, and this distinction it has never surrendered; rather has it grown stronger, with the development of the great industrial east.

Size and Location. The state has the shape of a rude triangle, with the apex formed by New York City on the south and the base formed roughly by Lake Erie, Niagara River, Lake Ontario and Saint Lawrence River. With an area of 49,204 square miles, of which 1,550 square miles are water, New York is about one-fifth the size of Texas and one-fifteenth as large as the province of Ontario on the north. The state nearest to it in size is Louisiana, which is 698 square miles smaller. New York occupies about the same area as England. The extreme length of the state from north to south is 312 miles; the greatest breadth is 326 miles.

Its People. New York is the most populous state in the Union, and has ranked first in population since 1820. It had in 1920 a population of 10,385,227 inhabitants, showing an increase of 1,271,613 in the ten-year period from 1910 to the census year 1920. According to the state census it had 9,687,744 inhabitants in 1915. On January 1, 1910, the Census Bureau reported the number as 9,113,614. The European country nearest to New York State in point of population in 1912 was Belgium, which had 7,571,387 inhabitants. With an average number of 217.9 persons to the square mile, the state ranks fifth in density of population, being surpassed by Rhode Island, Massachusetts, New Jersey and Connecticut. Nearly four-fifths of the whole population lived in towns in 1920, as compared with an urban population of less than three-fourths of the whole in 1910. Of its total population, 35.4 per cent were native whites of native parentage; 33 per cent were native whites of foreign or mixed parentage; 29.9 per cent were foreign-born whites, and 1.5 per cent were negroes. The foreign-born population of the state numbered 2,729,272.

Religion. About sixty per cent of the people of New York are Roman Catholics. Of the Protestant denominations the Methodists are the most numerous, followed by the Presbyterians, Episcopalians, Baptists, Lutherans and Congregationalists. There are in the state a

great number of Jews. New York City contains the greatest cathedral on the American continent, that of Saint John the Divine.

Education. The educational system is under the direct supervision and strict control of the board of regents for the University of the State of New York and their executive officer, the commissioner of education. The board of regents consists of twelve members, elected by joint ballot of the legislature for a term of twelve years, one retiring each year. The board appoints the commissioner of education, who exercises general supervision over all common, secondary, high and special schools. He has very wide powers, and is assisted by three assistant commissioners. There are no county superintendents in New York. The local supervisory unit is the supervisory district which is usually a part of a county and which is under a district superintendent elected for five years. The legislature of 1917 enacted a law, which has been approved by the governor, substituting a township system for the old school district system which has been in operation for more than a century. The local unit of administration is, therefore, no longer the school district but the township.

Universities and Colleges. In each section of the state is located some well-known college or university. New York does not maintain a state university, like so many of the states. Cornell University, located at Ithaca, has received from the state a grant of land for the establishment of a college of agriculture and mechanical arts and has the position of a semistate university. Although founded as late as 1869, Cornell has become one of the leading universities in the United States. The oldest, as well as the greatest, of the higher institutions of learning in the state is Columbia University, located in New York City. Affiliated with it are Teachers College and Barnard College for women.

The chief institutions of higher education, arranged in alphabetical order, are as follows:

Adelphi College, Brooklyn
Alfred University, Alfred
Buffalo University, Buffalo
Clarkson Technical School, Potsdam
Colgate University, Hamilton
College of the City of New York, New York
Elmira College, Elmira
Fordham University, New York
Hamilton College, Clinton
Hobart College, Geneva
Hunter College, New York
Manhattan College, New York
New York University, New York
Niagara University, Niagara
Polytechnic Institute, Brooklyn
Pratt Institute, Brooklyn
Rensselaer Polytechnic Institute, Troy
Rochester University, Rochester
Saint Lawrence University, Canton
Smith College (for women), Geneva
Syracuse University, Syracuse
Union University, Schenectady
Vassar College (for women), Poughkeepsie
Wells College (for women), Aurora

The United States Military Academy is at West Point. There are nearly a thousand secondary schools.

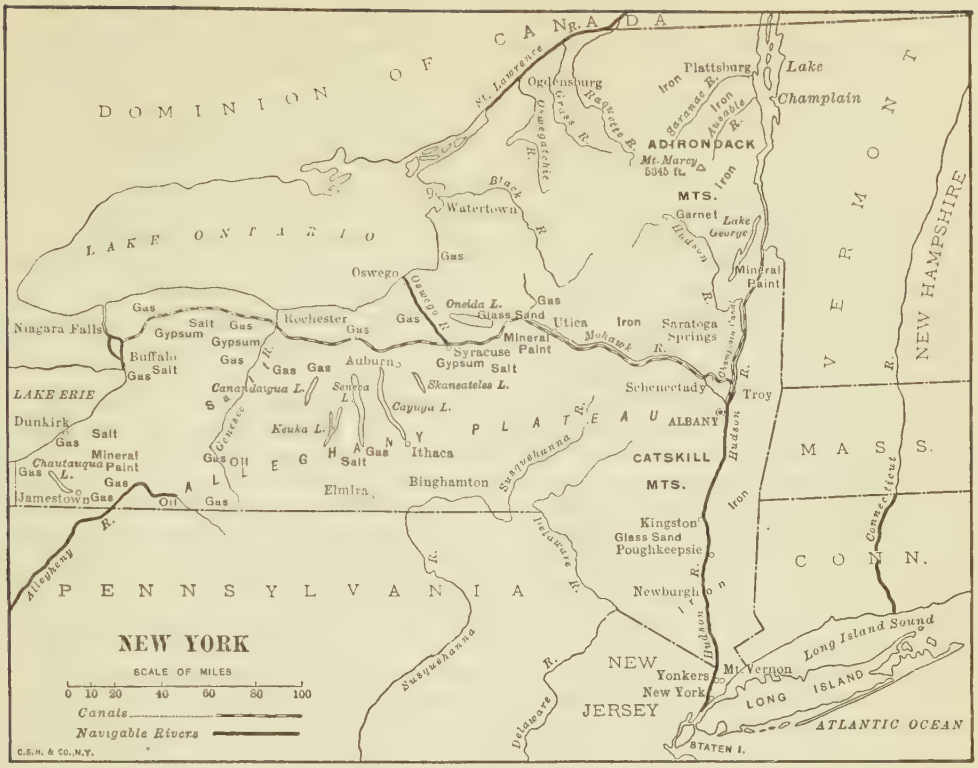
Normal Institutions. For the training of teachers the state maintains the State College for Teachers at Albany and normal schools located at Brockport, Buffalo, Cortland, Fredonia, Geneseo, New Paltz, Oneonta, Oswego, Plattsburg and Pottsdam. In New York City are located the New York, Brooklyn and Jamaica training schools for teachers. Training schools are also maintained at Albany, Buffalo, Cohoes, Jamestown, Rochester, Schenectady, Syracuse, Watertown and Yonkers. These local training schools are required to maintain courses of study approved by the Education Department of the State, and the requirements for admission to such schools are the same as the requirements for admission to state normals.

There are also 113 of the high schools which maintain special courses for the training of teachers. These special courses are called "training classes," and the particular object of such classes is to train teachers for the rural schools of the state.

Illiteracy. On account of the large foreign-born population of the state the percentage of illiteracy is rather higher than the educational facilities would warrant. In 1910 there were 406,020 persons of ten years of age or over who could not read or write; this represents 5.5 per cent of the population. But among the native white population alone the percentage of illiteracy was only 0.8 per cent; it reached 13.7 per cent among the foreign-born inhabitants, and was 5 per cent among negroes.

Physical Features and Resources

Physical Features. There are great differences in the physical features of the state. Speaking generally, the northern and eastern parts are mountainous, while the remainder of the state is a region of low plateaus and rolling plains. Excluding Long Island, the surface of



OUTLINE MAP OF NEW YORK

Showing boundaries, navigable rivers, principal canals, leading cities, location of gas and oil, salt and gypsum fields, and the highest point of land in the state.

which is low and level, New York can be divided into several well-marked physical regions.

Eastern Mountain Belt. This is a region of rugged hills and low mountains, which are the continuation and foothills of the Green Mountains and of the Berkshire Hills of New England. It occupies the entire portion east of the Hudson River.

The Plateau Region and the Catskill Mountains. West of the Hudson River is the plateau region, which extends through Southern and Central New York almost to Lake Erie. This region is the northern extension of the Alleghany plateau, which skirts the western base of the Appalachian Mountains. The eastern limit of this plateau is formed by the Catskill Mountains. These mountains cover an area of about 500 square miles, and are in the form of a group rather than that of a range. Many of their slopes are wooded and the intervening valleys are fertile. The region of the Catskills, like that of the Adirondacks, is a favorite summer resort. The highest peak, Slide Mountain, has an altitude of 4,205 feet, and there are several peaks between 3,000 and 4,000 feet high. This whole extensive plateau region is cut up by many deep and wide valleys, which have a general direction from north to south.

The Adirondacks. The most notable feature of New York's surface is the roughly-circular mountain region known as the Adirondacks (which see). It has an area of over 5,000 square miles and covers all the eastern and northern portion of the state, extending south to the Mohawk Valley. The Adirondack region is justly celebrated for its beautiful and wild scenery, for its rugged peaks, its primeval forests and its hundreds of lakes and mountain streams. It contains several peaks between 3,000 and 4,000 feet high. The highest peak, Mount Marcy, 5,345 feet, is the highest point of the state.

To the west of the Adirondacks and north of the plateau region extends the lake shore plain, which has a slightly undulating surface, sloping gently towards the lakes. The soil of this plain is very fertile and the region is specially suited for fruit raising.

The Mohawk Valley. Extending from the Hudson River near Albany and west to Utica is

the low, narrow valley of the Mohawk River. The Hudson-Mohawk Valley, which forms the only great break in the Appalachian system, offers the best way to the interior of the continent. It constituted the only natural trade route between the Atlantic and the Great Lakes even before the building of the Erie Canal.

Rivers. All parts of the state are well supplied with rivers, which find their way into the Atlantic Ocean by five different drainage basins. These navigable waters and the open valleys which lead out in all directions have been among the main factors which have contributed to give New York its leading commercial position. Foremost among them are the Hudson and the Mohawk. The Hudson River, which rises in the Adirondacks, is the most important river wholly within the state, and is navigable for large boats for a distance of over 150 miles. Its chief affluent is the Mohawk, which waters the central part of the state. Just before it enters the Hudson near Cohoes it forms a magnificent waterfall.

The rivers in the northern part of the state flow into lakes Erie and Ontario and are drained through the Saint Lawrence into the Atlantic Ocean. Among these rivers are the Genesee, which in a course of about 100 miles completely traverses the state from south to north; and the Oswego, whose affluent, the Seneca, gathers the waters of the Finger lakes. The southern part is drained by the Delaware, the Susquehanna and the Allegheny.

Waterfalls. Many of these rivers flow through wide and fertile valleys during the greater part of their course, but at some points pass through deep gorges and form notable waterfalls. Besides their scenic beauty these falls are sources of water power, a fact that has caused the establishment of large industrial plants in their neighborhood. Chief among them are Niagara Falls (see NIAGARA FALLS AND RIVER), the greatest natural generator of power that has yet been harnessed for the service of man. Other falls are the Genesee Falls at Portage and Rochester; the Taughannock Falls, near Cayuga Lake, the highest in the state, with a fall of 230 feet; the Trenton Falls, formed by the West Canada Creek, which in a course of two miles has a descent of 310 feet; the Glens Falls, formed by the Hudson, and the falls of the Mohawk, near Cohoes.

Lakes. New York contains a large number of lakes, either wholly or partly within its boundaries. Noted for its picturesque scenery is Lake George, about forty miles long, which discharges its waters into Lake Champlain, half of which belongs to New York. In the plateau region directly south of Lake Ontario there is a group of long, narrow, navigable lakes, nearly parallel to each other, with their greatest length extending from north to south. These are known as the *Finger Lakes.* The most important of this group are Cayuga and Seneca, each nearly forty miles long and from two to three miles wide; Canandaigua, Onondaga and Keuka. Northeast of these is Lake Oneida. In the extreme southwestern part of the state is Lake Chautauqua, famous as a summer resort, on the shores of which is situated the home of the Chautauqua Institution. See CHAUTAUQUA, subhead *Chautauqua Institution.*

Climate. As is to be expected in a state which possesses such a diversity of surface, the climate of New York shows great variation. It has a continental type of climate characterized by extremes of heat and cold and subject to sudden changes of temperature (see CLIMATE). It is much milder in the neighborhood of the lakes, which tend to moderate the heat of summer and the cold of winter and to prevent the late frosts of spring and the early frosts of fall, from which so many parts of the state suffer. The summer maximum is 100° Fahrenheit; the winter minimum is zero on the sea border and ranges from 20° to 40° below zero in the interior. The rainfall is abundant but not excessive, the average being about forty-one inches a year. The snowfall is heavy in nearly all parts of the state.

Agriculture. New York is still an important agricultural state, although it has lost the first place which it occupied for so many years. As regards the value of agricultural products it averages as eighth among the states of the Union. Nearly three-fourths of the total land area, which is 30,498,560 acres, is occupied by farms, and of this amount two-thirds is improved land. The average size of a farm is 102.2 acres, and the average value of an acre is $53.25. About four-fifths of the farms are operated by owners or their managers, and only one-fifth by tenants. The chief crop, both as regards acreage under cultivation and value of product, is hay. In hay production New York occupies the first place among the states, followed by Iowa and Pennsylvania. The area given to hay is about 4,500,000 acres, and the production amounts to about 5,850,000 tons a year, with a total value of approximately $82,000,000.

Oats, with an acreage of about 1,340,000 acres and a production of 54,250,000 bushels a year, ranks first among the cereals. In its acreage of buckwheat, about 280,000 acres, New York ranks first among the states, closely followed by Pennsylvania. In its acreage in potatoes, over 355,000 acres, the state also ranks first, closely followed by Michigan. New York also ranks first in the production of vegetables and garden produce, which find a ready market in the numerous cities. The area in vegetables is over 175,500 acres. It is worth noticing that over 35,000 acres are devoted to the growing of cabbages, which represents an area more than three times larger than that in Wisconsin, which ranks next in this respect.

The soil and climate on the borders of lakes Erie and Ontario and in the region around the Finger Lakes are specially suited for the growing of fruit. Here large quantities of peaches and grapes are raised. As regards the area under vineyards New York is surpassed only by California. Fruit is also raised in large quantities in the Hudson Valley. New York leads all the states of the Union in the production of apples, which amounted to over 25,500,000 bushels in 1915. The state is also a large producer of maple sugar, ranking second after Vermont. Horticulture is greatly developed in New York, the raising of flowers for city markets having become an important industry.

Besides the state agricultural college attached to Cornell University the state maintains six schools of agriculture. These schools are located respectively at Cobleskill, Delhi, Farmingdale, Morrissville, and one at Canton in connection with Saint Lawrence University, and another at Alfred in connection with Alfred University.

Live Stock. With large regions in the state well suited by soil and climate for pasturage and with numerous large towns where the products are sought, it is only natural that the raising of live stock and dairy farming should constitute one of the chief occupations. In 1921 there were 21,081,274 milch cows, a number surpassed only in Wisconsin. A great deal of the milk is sold in the neighboring cities, but where these are too distant it is carried to creameries and cheese factories where it is turned into butter and cheese. New York takes high rank among the states as regards the quantity as well as the quality of these products. With a production of about 105,500,000 pounds of cheese annually, New York is second to Wisconsin, and these two states produce more than three-quarters of the cheese manufactured in the United States.

Forests. Large tracts in the Adirondacks and to a lesser degree in the Catskills are covered with dense forests. Nearly forty per cent of the whole area of the state is under timber. The chief trees are white pine, spruce and hemlock, intermingled with hardwoods—maple, beech, oak and basswood. Lumbering has been for a long time one of the state's chief industries, and even to-day New York is among the leading states as regards the value of its forest products. The state has adopted the policy of securing the ownership of large tracts of forest, and has established forest reserves both in the Adirondacks and the Catskills; over 1,825,000 acres are now in such forest preserves. A large state park has been established in the heart of the Adirondacks and a smaller one in the Catskills. The amount of timber cut, of which sixty per cent is soft wood, averages over 450,000,000 feet board measure a year. Large tracts of woodland are comprised in the farm lots, and forest products to the value of over $10,000,000 are produced yearly on the farms.

Fisheries. New York possesses rich fishing grounds in its extensive seacoast, and in its numerous lakes and rivers. It is one of the few states that contain fresh- as well as salt-water fisheries. In value of fishery products, about $5,000,000 a year, New York ranks third among the Middle Atlantic states. More than half of this value is represented by oysters.

Minerals. A great variety of mineral substance is extracted each year from the mines and quarries of New York. The principal metallic ore found here is iron ore, of which about 1,500,000 tons are mined annually. This is found in the Adirondacks, and nearly ninety per cent of the output comes from the region around Port Henry, on the southeastern shore of Lake Champlain. The clay deposits are among the most valuable resources of the state. These are found mostly along the banks of the Hudson and in Long Island. The clay is used for making bricks, pottery, terra cotta and porcelain for electrical supplies. The Hudson Valley has become the greatest brickmaking region in the world, on account of its large deposits of clay and the cheap transportation by water to New York City.

New York ranks third among the states of the Union in the value of the products of its quarries, being surpassed only by Pennsylvania and Vermont. The chief products are granites,

limestones, sandstones and marble. The white marble used in many of New York's finest buildings has come from the marble quarries found at Tuckahoe, in Westchester County. Some of the choicest varieties of black marble quarried in the United States have come from an extensive deposit of limestone found near Glens Falls. Cement, which is produced in large quantities, ranks third in value among the mineral products.

New York is the largest salt-producing state in the Union, closely followed by Michigan; its production is about 10,400,000 barrels a year. Extensive deposits of rock salt beds which vary from a few inches to 150 feet in thickness are found south of Lake Ontario and in the Genesee Valley. The growth of towns like Syracuse and Ithaca was due at the beginning to the working of these extensive salt deposits. The location of large manufactories of chemicals and glass is also due to the abundance of the salt deposits. In the same region occur deposits of gypsum, in the production of which New York ranks first. The state leads in the production of graphite, which is mined around Lake George, and in that of fibrous talc, which is extracted near Talcville, in Saint Lawrence County. It also leads in the production of aluminum and of millstones, and ranks second in the production of feldspar.

Petroleum is extracted in the southwestern part of the state, the oil fields here being a continuation of the Pennsylvania fields. In the same and adjacent regions is also found natural gas. New York has over forty springs which contain mineral water. The best-known among them are the springs found at Saratoga, which attract a great number of visitors.

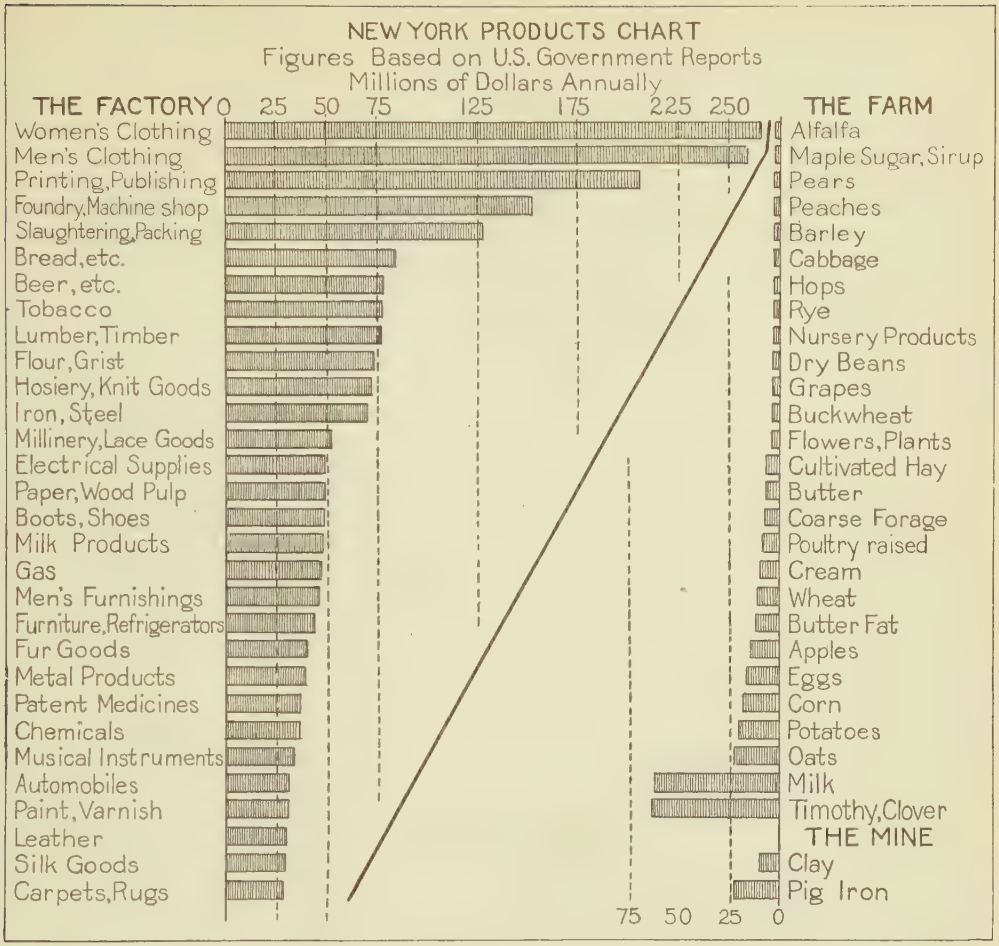
Manufactures and Commerce

Manufactures. New York is the leading manufacturing state in the Union, and has continuously occupied this position since 1830. Its favorable geographical situation, its own great natural resources, its abundance of water power, its splendid transportation facilities, its commercial supremacy and the necessity of supplying the needs of a large population are among the chief factors that have contributed to the state's great industrial development. The industry of New York is characterized rather by a great diversity of objects manufactured than by an overwhelming superiority in single lines of manufactures. A notable exception is Troy, where over ninety per cent of the shirts and collars made in the United States are manufactured. The same applies to the manufacture of gloves and mittens, of which three-quarters of the whole output of the country is produced in the state, and about two-thirds of this amount in the neighboring towns of Gloversville and Johnstown.

The value of the products manufactured in its 49,367 factories in 1920, a year of high prices, was $8,874,638,000; the capital employed was $6,033,828,000, and the number of wage-earners was over 1,500,000. The most important industry in the state is the manufacture of men's and women's clothing. More than half of the total value of clothing manufactured in the whole country was produced in New York. New York also leads in the printing and publishing industry, the value of which is thirty per cent of the country's production. More newspapers and periodicals are issued here than in any other state. As regards the value of products, this is the second industry in the state. Foundry and machine-shop products come next in value, and in this respect New York ranks second among the states. This includes the manufacture of small and delicate machines, like sewing machines, typewriters and similar objects, as well as agricultural machinery and implements.

New York ranks third among the states of the Union in the value of its manufacture of textiles. This group includes the manufacture of hosiery and knit goods; carpets and rugs; various cotton, woolen, worsted and felt goods; silk and silk goods and other textiles. But there are many branches of the textile industry in which the state ranks first. Slaughtering and meat packing is another important branch of industry in which New York ranks high. In the value of flour and gristmill products, which is one of the oldest industries in the state, it ranks second. The manufacture of malt, distilled and vinous liquors is a very important industry, the state ranking first among the states in the value of its malt liquors. An enumeration of minor manufactures, many of them reaching the status of great industries, would be a huge task. It may be summarized in the statement that this state manufactures in greater or less quantities practically everything used by man.

Transportation. New York far outranks any other state as regards its facilities for water



transportation. It is bordered on one side by the Atlantic Ocean and on the other side by lakes Erie and Ontario; it is traversed by several navigable rivers, and possesses a great number of small, navigable lakes. The Erie Canal, opened in 1825, and now a part of the great Barge Canal system, connects the Hudson River at Troy with Lake Erie at Buffalo. This canal has played an important part in the commercial and economic development of the state, and along its route several important cities have developed. In addition to this canal several others have been built, so the state has nearly 1,100 miles of navigable waterways. See Erie Canal; New York State Barge Canal.

New York is well supplied with railroad facilities. Several trunk lines extend from the seaboard to the lakes, and most of them send branches across the central and western parts of the state through the parallel valleys which run from north to south. This gives the net of railroads, when seen on the map, the appearance of a rude ladder. The state had 8,733 miles of railroad in 1915. The principal lines are the New York Central and Hudson River; the Erie; the Delaware & Hudson; the Lehigh Valley; the Delaware, Lackawanna & Western; the New York, Ontario & Western; the Long Island; the Pennsylvania; the New York, New Haven & Hartford, and the Central New England. In addition to these lines the Central Railroad of New Jersey and the Philadelphia & Reading, which enter Jersey City, have ferry connection with New York City.

Commerce. In commerce New York surpasses all other states. Over one-third of the exports and nearly two-thirds of the imports of the United States pass through the port of New York City. Large as this foreign trade is, the coastwise trade is vastly larger. The state

has a number of ports of entry, among which are Buffalo, Rochester, Niagara Falls, Oswego, Ogdensburg and Plattsburg. Much of the domestic traffic between the East and the West passes through the state. In addition to this carrying trade, the great diversity of industries within the state itself, combined with its large population, makes its domestic commerce larger than that of any other section of the United States of the same area.

Government and History

Government. New York is governed under the constitution adopted in 1894. This is the fourth constitution the state has had, the other three having been adopted in 1777, 1821 and 1846, respectively. An amendment to the constitution can be introduced only after it has been adopted by two successive legislatures and has been approved by the people. A new constitution was prepared by a special constitutional convention assembled in 1915, but it was rejected by the people. Counting from 1916, the question of revising the constitution may be submitted to the people at the general election every twenty years.

The executive officials, the governor, lieutenant-governor, secretary of state, state treasurer, state comptroller, attorney-general and state engineer or surveyor, are elected for two years each. The lieutenant-governor presides over the senate.

The legislative power is vested in a senate of fifty-one members, elected for two years, and an assembly of 150 members, elected for one year. Sessions of the legislature begin on the first Wednesday in January of each year, and are not limited as to their duration. No person is eligible to the legislature who at the time of his election is, or within 100 days previous thereto has been, a member of Congress, a civil or military officer of the United States, or an officer under any city government.

New York sends forty-three members to the United States House of Representatives.

The judicial system is headed by a court of appeals, a supreme court and an appellate division of the supreme court. The highest court in the state is not, as in most states of the Union, the supreme court, but the court of appeals. This is composed of a chief judge and nine associate judges, elected for fourteen years. The supreme court consists of 101 judges elected for fourteen years. The governor designates from the justices of the supreme court those who shall constitute the appellate division. The state is divided into four judicial divisions, and for each of them there is an appellate division of the supreme court. The County of New York by itself forms one division. Below these are the usual county and lower courts. Justices of all courts must retire when they have reached the age of seventy years.

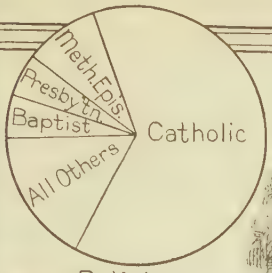
For purposes of local government the state is divided into counties, but the chief units of local government are the cities, incorporated villages and towns. The cities have been divided according to population into three classes; the first class contains those with 175,000 inhabitants or more; the second class those with 50,000 to 175,000 inhabitants; and the third class all the other cities. Each class is allowed to organize its government according to general plans established by the legislature. All special laws affecting a city must be submitted to the mayor for his approval.

Other Statutory Provisions. Legislation since 1912 has resulted in a strict fire-prevention law for factories, and its enforcement is in the hands of the Industrial Commission. Several measures for the protection of the labor of women and children are in force. Work for women in factories between ten o'clock at night and six o'clock in the morning is prohibited. Women may not work in factories or mills within four weeks after childbirth. A workmen's compensation act has been in force since 1913. In 1915 a law was passed providing a pension for widowed mothers, the object of which is to prevent children from being separated from their mothers and sent to orphan asylums. For the conservation of the natural resources of the state a special conservation department has been created.

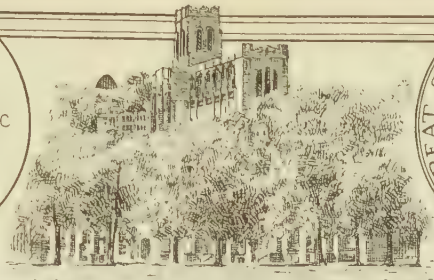
New York has a primary election law for the nomination of all state officers. There are two public service commissions, one for New York City and another one for the rest of the state. The public service commission has general regulatory power over public service corporations and may determine the maximum railway fare rates.

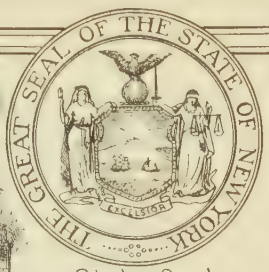
Charitable and Penal Institutions. The state maintains a large number of charitable and penal institutions. State prisons are located at Auburn, Ossining (popularly known as Sing Sing) and Clinton, and the Great Meadows

NEW YORK, THE EMPIRE STATE

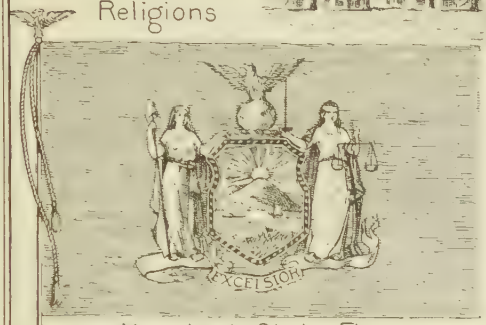


Religions



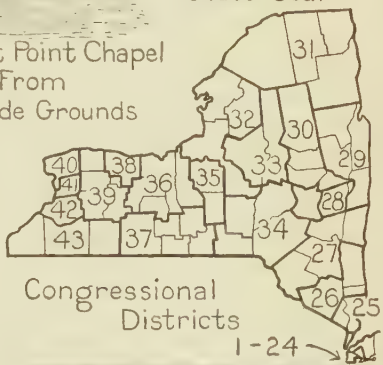


State Seal

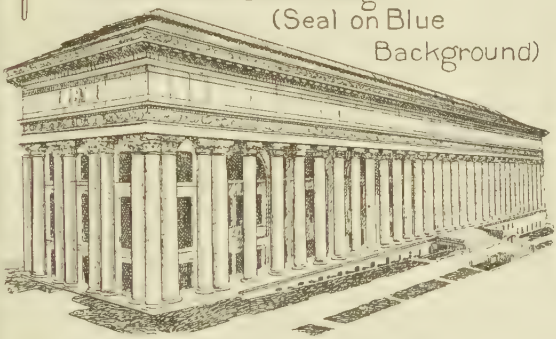


New York State Flag
(Seal on Blue Background)

West Point Chapel
From
Parade Grounds



Congressional Districts
1-24


State Educational Building
Albany

Salt Mine

Adirondack Park

Palisades of the Hudson

prison is at Comstock. The prison for women is also at Auburn. The reformatories at Elmira and Napanoch are for boys, and that at Bedford for girls; there is a training school for girls at Hudson and an industrial school for boys at Industry, near Rochester.

The asylums for the insane are located at Utica, Willard, Poughkeepsie, Middletown, Buffalo, Binghamton, Ogdensburg, Rochester, King's Park, Central Islip and Gowanda. There are two asylums for insane criminals, located at Matteawan and Dannemora. The asylum for feeble-minded children is at Syracuse, and that for feeble-minded women is at Newark. A state custodial asylum is maintained at Rome. Craig Colony for Epileptics is maintained at Sonyea, and a second institution is maintained at Letchworth Village for epileptics and feeble-minded persons.

The school for the blind is at Batavia. There is also an institution in New York City known as "The New York Institution for the Blind," which, though private, receives state pupils. An asylum for destitute and orphan Indian children is at Iroquois. The state hospital for the care of crippled and deformed children is at West Haverstraw; the state hospital for the treatment of incipient tuberculosis is at Raybrook. A soldiers' and sailors' home is at Bath.

The Dutch Period of History. In the names of its rivers, lakes, towns and counties New York state has many memorials of its eventful history. Thus the many Dutch names remind us that the Dutch were the first settlers of this region. In 1609 the Englishman, Henry Hudson, who was in the service of a Dutch company, entered the harbor which is now named New York and sailed up the river which now bears his name. The Dutch soon established temporary trading posts and prosperous settlements, and they maintained a profitable fur trade for years. The first settlements were made on Manhattan Island in 1623 and at Albany in 1624. Two years later the Dutch governor, Peter Minuit, bought from the Indians Manhattan Island, now the heart of New York City, giving in return goods valued at twenty-four dollars.

The English Period. The Dutch came in constant collision with the English on the east and south, and finally were forced to relinquish their hold on the territory in 1664, when this region, New Jersey and Delaware were occupied by England and granted to the Duke of York, brother of Charles II. The name of New Netherland was now changed to that of New York. For a time the colony prospered under liberal rule, but it was later made the victim of worthless and unscrupulous governors. It suffered severely by the invasions of French and Indians during the wars of the eighteenth century. In the early days of the pre-Revolutionary struggle the colony contained many Tories, but the patriots were largely in the majority, and some of the most defiant actions of the whole struggle were taken by New York. A popular convention met at White Plains in 1776 and organized an independent government. It adopted in the following year a constitution which remained the state constitution for the next forty-five years.

Early History as a State. During the War of Independence the state was the scene of many important military operations. Worthy of special mention are the Battle of Oriskany (August, 1777) and the surrender of Burgoyne at Saratoga (October, 1777), two of the most decisive military events of the war. New York was among the first to ratify the Articles of Confederation (1778), but it opposed a strong Federal government, two of its three delegates withdrawing from the Constitutional Convention of 1787. It was the eleventh state to ratify the Constitution (July, 1788). The Continental Congress met at New York from 1785 to 1790, and it was here that Washington was inaugurated President in 1789. The Federalists were at first dominant in the state, but after 1800 the Republicans were in power for more than twenty years, chiefly under the leadership of De Witt Clinton, one of the most able of the governors who have occupied the executive chair of New York. A second constitution was adopted in 1821, and a third, which abolished feudal tenure of land, in 1846. This constitution remained in force until 1894, when the present constitution, amended several times, was adopted.

Recent History. Though a free state, New York was divided in the slavery struggle; and during the early years of the War of Secession the Democrats, or antiadministration party, were in power. Nevertheless, the state was one of the strongest supporters of the Union cause and furnished 467,000 troops to the Federal army. Since the War of Secession its development has been rapid and continuous. In state politics as well as in Presidential elections New York is an uncertain state. In the election of 1912 Woodrow Wilson carried the state for the Democratic party; in 1916 and 1920 the Republican candidates won the state. In

RESEARCH QUESTIONS ON NEW YORK

(An Outline suitable for New York will be found with the article "State.")

What mountains of the state play a part in one of the earliest and one of the most popular stories ever written in the United States?

How did New York long rank among the agricultural states? How does it rank to-day?

How many constitutions has the state had in the course of its history? When was the present one adopted?

What will be the next year in which the question of a constitutional revision may be brought before the people?

For whom was this state named? What name had it borne previously? What had its chief city been called?

What has won for New York its popular name? Why is it sometimes called the "pivotal" state?

How much smaller is New York than the largest state? How much larger than the smallest?

How long has it been since any state had a larger population than New York?

How does it happen that a state with such an excellent school system has so large an illiteracy percentage?

Is the highest point in the state higher or lower than that of Maine? Of Iowa? Of Kansas? Of South Carolina?

Why was the valley of the Mohawk River so important in the early history of the state?

Of what use, other than as navigable waterways, have the rivers of New York been in its development?

What is the "greatest natural generator of power that has yet been harnessed?"

What are the *Finger Lakes,* and why are they so called? What lake in this state has given its name to a well-known institution?

Why is the region about the Great Lakes better suited to the raising of fruits than is the rest of the state?

What proportion of the total land area is in *improved* farms?

Mention three agricultural products in which New York leads all the states.

Mention two in which it surpasses any other state in acreage.

What does the state do to help the farmers?

What does it do toward the preservation of its forests?

If you might have the annual sale price from one of New York's fishing products, which would you choose?

What industry in which the Hudson Valley surpasses any other region in the world depends on a mineral product of the valley?

Of what mineral substance which practically every one uses every day does New York produce more than any other state?

Why might you expect New York to manufacture many lead pencils?

What factors have contributed to the remarkable growth of the manufacturing industries of the state?

What proportion of the foreign trade of the country passes through the great port of this state?

What stand did the state take with reference to the Federal Constitution? When was a President inaugurated in this state?

1921 a commission was created to distribute a bonus to veterans of New York who served in the late war, either at home or in France. T.E.F.

Consult Hale's *New York*, in "Tarry at Home" Travels; Irving's *Knickerbocker's History of New York;* Roberts' *New York: the Planting and the Growth of the Empire State;* Randall's *History of the State of New York;* Prentice's *History of New York State*, for use in high schools and academies.

Related Subjects. The following articles, of interest in connection with a study of New York, will be found in these volumes:

CITIES

Albany
Amsterdam
Auburn
Batavia
Beacon
Binghamton
Brooklyn
Buffalo
Cohoes
Corning
Cortland
Dunkirk
Elmira
Fulton
Geneva
Glens Falls
Gloversville
Hornell
Hudson
Ithaca
Jamestown
Johnstown
Kingston
Lackawanna
Little Falls
Lockport
Matteawan
Middletown
Mount Vernon
Newburgh
New Rochelle
New York
Niagara Falls
North Tonawanda
Ogdensburg
Olean
Oneonta
Ossining
Oswego
Peekskill
Plattsburg
Port Chester
Port Jervis
Poughkeepsie
Rensselaer
Rochester
Rome
Saratoga Springs
Schenectady
Syracuse
Troy
Utica
Watertown
Watervliet
White Plains
Yonkers

EDUCATION

Barnard College
Columbia University
Cornell University
Military Academy, United States
New York, College of the City of
New York, University of the State of
New York University
Syracuse University
Vassar College

HISTORY

Clinton, De Witt
Crown Point
Hudson, Henry
Revolutionary War in America
Saratoga, Battles of
Stony Point

LAKES

Cayuga
Champlain
Erie
George
Oneida
Ontario
Seneca

LEADING PRODUCTS AND INDUSTRIES

Aluminum
Apple
Buckwheat
Cabbage
Cheese
Dairying
Glove
Granite
Grape
Graphite
Gypsum
Hay
Iron
Lumber
Marble
Oats
Oyster
Potato
Printing
Salt

MOUNTAINS

Adirondack
Catskill

RIVERS

Allegheny
Delaware
East River
Genesee
Hudson
Mohawk
Niagara Falls and River

UNCLASSIFIED

Algonquin Park
Ausable Chasm
Brooklyn Bridge
Ellis Island
Hell Gate
Liberty, Statue of
Long Island Sound
Palisades
West Point

NEW YORK, the greatest city in the Western hemisphere, and, referring strictly to corporate lines, the largest city in the world. The population of London, England, including the metropolitan and city police districts, is over 7,476,000, but Registration London, the city proper, contained 4,750,021 people at the census of 1921. Greater New York in 1910 had a population of 4,766,883; the state census of 1915 credited it with 5,006,484, and the Federal census of 1920 gave the city 5,620,040 (18 per cent gain in ten years).

This vast city in its everyday life presents statistics which emphasize its greatness, and from these there have arisen popular fancies which reveal New York in certain unfavorable lights, most of which are incorrect and misleading. We are told that every second four visitors arrive in the city; that every forty-two seconds in normal years an immigrant from

across the Atlantic enters the harbor; that every fifty-two seconds a passenger train arrives. Mammoth buildings, from twenty to fifty-five stories high, tower on all sides in the business section; the street called Broadway is featured in thousands of newspapers; the wonderful "tubes," or tunnels, captivate the fancy; the stories of Wall Street manipulations are sometimes almost unbelievable; the city requires 22,000 school teachers, 10,000 policemen, 5,000 firemen and 3,000 street cleaners. To some people all these and other statistical facts cast the glamour of unreality over the city. The many thousands of daily visitors take away with them transient impressions which find expression in such terms as "Bagdad-on-the-Hudson" and "Modern Babylon."

Of what is New York really composed? To the student of municipalities it is found to be full of serious people who never worry about the Four Hundred who compose "society;" who seldom appear on the great "White Way," as half a mile of Broadway has been termed; who have but a vague knowledge of the Stock Exchange. They are not in the limelight, and thus are not of that New York which is heralded "back home" by visitors. They go their way as do people elsewhere—up in the morning, down to work, home in the evening. They are different in that many of them live in layers of stone and mortar, from seven to ten and twenty stories high, but that is because they are obliged to do so; otherwise their hopes, experiences and ambitions are not unlike those of their country cousins. There are five million people in Greater New York to whom a home is a private institution; comparatively few of the population travel to the measure of sprightly music, and these do so largely for the amusement of the visitor.

Geography of the City. When New York is referred to there usually comes to mind only the congested area of Manhattan Island. Until 1898 the city did not extend beyond the island, which is about thirteen miles long and a mile and a half in average width. To the east, across East River, was Brooklyn, with a million people, and with a populous suburban district north and east; north of Manhattan, and separated from it by the Harlem River, was the rapidly-growing Bronx; to the southwest, barely separated from the New Jersey mainland, was Staten Island, forming the New York County of Richmond, and naturally tributary to the metropolitan district. On January 1, 1898, Greater New York, with five boroughs, or divisions—Manhattan, Brooklyn, Queens, the Bronx and Richmond—came into existence, by act of the legislature in the preceding year. These boroughs now form one great city, and surrounding them on three sides are very populous suburban residence and manufacturing districts of three states—New York, New Jersey and Connecticut—with interests very largely dependent upon the great city.

The southern end of the borough of Manhattan is the commercial and financial center, the middle section contains the department stores, hotels, theaters and railroad stations, and the upper part the residences; Queens is

THE METROPOLITAN DISTRICT

The five boroughs comprising Greater New York are shown in black. Just outside, but contributing to the city's life, are the following:

(1) Jersey City
(2) Hoboken
(3) Newark
(4) Elizabeth City
(5) Palisades
(6) Yonkers
(7) Mount Vernon
(8) New Rochelle
(9) North Hempstead
(10) Hempstead

essentially a select residence district, and the Bronx, rapidly extending northward, is also a district of homes. Brooklyn retains the old characteristics it possessed before becoming a part of Greater New York, and therefore is a combination of a great business section near the water fronts and of fine residence districts eastward. Richmond (Staten Island) is the least developed of the boroughs, but is the home of thousands of people whose business interests are in Manhattan; it has an area of fifty-seven square miles and an ocean frontage of thirteen miles.

Besides the islands—Manhattan and Staten —already mentioned, the city includes Blackwell's, Ward's and Randall's islands, in the

East River, on which are located the city institutions of correction and charity; Governor's Island and Ellis Island, the landing place for immigrants, in Upper New York Bay; Coney Island, a famous pleasure resort, in the southern part of Brooklyn Borough; a number of small islands in Jamaica Bay, also a part of Brooklyn, and others of lesser importance in the vicinity of the Bronx. The total area of Greater New York is 327¼ square miles, including water surface; the land surface is 285 square miles.

Water Boundaries. The Hudson River sweeps majestically down the western side of Manhattan and the Bronx, pouring its water into Upper New York Bay. Between the Bronx and Manhattan is the Harlem River, which is connected with the Hudson by Spuyten Duyvil Creek, at the north end of Manhattan. The Harlem empties into the East River, which flows between Manhattan on the west and Queens and Brooklyn on the east, and connects the Upper Bay and Long Island Sound. Between Brooklyn and Richmond boroughs is a strait called the Narrows, which connects Upper New York Bay with the Lower Bay, the latter practically a part of the Atlantic. The Upper Bay forms one of the finest harbors in the world. It is about six miles long and five miles wide, the longer distance being from north to south, and is nearly fifteen square miles in area. In this bay, near its northern end, is the former Bedloe's Island, now Liberty Island, with its great statue, *Liberty Enlightening the World.* Facing the Narrows stands this gigantic goddess—a symbol to stir the emotions of the hopeful immigrant who passes in on his way to opportunity (see LIBERTY, STATUE OF). The Narrows is about one mile wide at the narrowest point, and is there guarded by forts Hamilton and Wadsworth.

Manhattan's Streets. New York has three streets whose fame is world-wide—Wall Street, symbolizing financial strength; Fifth Avenue, the center of wealth and fashion; Broadway, on which the eyes of the amusement world are focused. Broadway extends the entire length of the island. It begins at Battery Park and nearly bisects the southern two miles, then gradually turns westward and above Central Park runs near to and parallel with the Hudson River. It skirts several small parks, or squares, in its progress northward, notably City Hall Park, Union Square, at 14th Street; Madison Square, at 23rd Street; Greeley and Herald squares, at 33rd and 34th streets; Times Square, at 42nd Street, and Columbus Circle, at 59th Street, at the southwest corner of Central Park. Under Broadway for its entire length runs one of the lines of subways, described elsewhere in this article.

Wall Street has long been the money center of the Western hemisphere. After the United States began to supply munitions and food to the allied countries in the War of the Nations the balance of the world's financial strength gradually was acquired, but whether the ascendancy of New York will be retained only the future can determine. The street begins at Broadway at Trinity Church (see subhead *Historic Buildings*), well towards the southern end of the island, and extends eastward to East River. The financial district is not limited to Wall Street, but branches out on several cross thoroughfares, notably Nassau and Broad.

Fifth Avenue begins at historic Washington Square and runs straight northward. The beautiful Washington Arch, illustrated herewith,

WASHINGTON ARCH

A memorial to commemorate the inauguration of George Washington as President of the United States, in New York City, in 1789. The arch is 77 feet high and 62 feet wide, with an archway 47 x 30 feet. The cost, $228,000, was met by popular subscription. It was completed in 1893, and stands at the northeast corner of Washington Square, facing Fifth Avenue.

forms the entrance from the avenue to the square. Fifth Avenue between 34th or 35th Street and Central Park, at 59th Street, is the center of the most exclusive shopping district on the continent and possibly in the world, and

north of 45th Street are the residences of some of America's wealthiest people. From 59th Street to 110th Street the avenue is the eastern boundary of the park. The finest residence street on Manhattan, and one of the most beautiful boulevards in the world, is Riverside Drive, which skirts the Hudson River south from 72nd Street as far north as the Spuyten Duyvil Creek. Many of the large apartment houses along the Drive are palatial in their appointments, and the private homes are among the finest in the city.

In the lower end of the island there is little orderly arrangement of streets; they remain practically as laid out by the early settlers, when the town was a cluster of wooden buildings lying not far from the eastern and southern water fronts. In this section it is therefore difficult for the stranger to acquaint himself with his surroundings, but farther north, covering four-fifths of the island, the streets are nearly all at right angles, and on the whole New York City geography is easily mastered. The blocks north and south are short, about one-third as long as Chicago's, for example, but those running east and west average well with those of nearly all great cities.

Among the streets of lower Manhattan the Bowery, extending from Chatham Square to the junction of Third and Fourth avenues, deserves mention. Formerly the rendezvous of the East Side rough characters, it has largely outgrown its notoriety and has become a respectable street of homes and shops. Few Americans are found there, but it is the center of a large Jewish population.

Historic Buildings. The commercial spirit of the age has not entirely destroyed New York's evidences of age, as time is reckoned in the New World, but the city is not as rich in monuments of colonial days as are Boston and Philadelphia. Men have viewed old landmarks in terms of thousands of dollars per foot front, and many of the historic edifices have been sacrificed; in their old places are some masterpieces of twentieth-century architecture.

Trinity Church and Churchyard. The Trinity building is not old, for it dates only from 1846, but its situation in the heart of the lower city and its famous old burial ground make it one of the most cherished memorials of the metropolis. The location is on Broadway, at the head of Wall Street—religion confronting commercialism. The Church corporation is rich from the ownership of land in the vicinity granted to it in 1705, and it maintains several chapels and many missions out of its income of $500,000 a year. In the churchyard are buried many persons famous in American history. In 1914 there were men daring enough to propose the razing of the building and the removal of the cemetery that large buildings might occupy the space.

TRINITY CHURCH AND CHURCHYARD
In the burial ground are the graves of Alexander Hamilton, Robert Fulton, Captain James Lawrence, Albert Gallatin and General Philip Kearny.

Castle Garden. At the southern extremity of the island a battery was placed in position before the Revolutionary War, but was little used. The name Battery Park was given to the point, and in 1805 Fort Clinton was built on it, at the water's edge. Later the structure was abandoned for military purposes and it was remodeled into a popular meeting place. Lafayette was given a reception there in 1824. Afterwards it became a theater and in 1847 the home of grand opera. Jenny Lind appeared here in 1847. In 1885 the Federal government secured the building for a receiving station for immigrants, and for nearly seven years over a million foreigners a year passed through it into the New World. In 1891 the city secured the building and remodeled it to be the home of the New York Aquarium, one of the largest in the world (see AQUARIUM).

FORMER CASTLE GARDEN
Now the home of the New York Aquarium.

VAN CORTLANDT MANSION

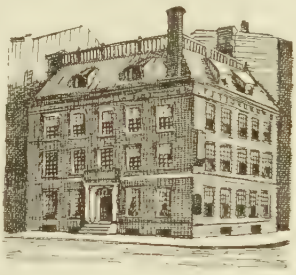
Van Cortlandt Mansion. The Dutch Van Cortlandts settled early in the north end of Man-

hattan Island; the two leading members of the family, Stephanus and Jacobus, were born when the town at the southern end was still New Amsterdam. They owned nearly all the land close to the Harlem River; eventually the city bought the estate and named it Van Cortlandt Park. The old manor house still stands, and is used as an historical museum.

Jumel Mansion. This home was erected in 1763. It was Washington's headquarters for five weeks in 1776, and the headquarters of the British General Clinton in the year following. Washington and his Cabinet were entertained here in 1790. The owner died in 1832, and his widow married Aaron Burr, with whom she lived but a short time. Fitz-Greene Halleck wrote *Marco Bozarris* in this residence. In 1903 the city purchased the building and grounds for $235,000, and it is now a museum of relics of the Revolutionary period. It stands at 160th Street and Jumel Place.

THE JUMEL MANSION

Fraunces' Tavern. This once famous house is one of the oldest buildings in the East standing. It was built in the year 1700, in a location which is now the corner of Broad and Pearl streets. It was a common meeting place of Revolutionary leaders, and in the building, in December, 1783, Washington took leave of his officers and aides. To preserve the building from destruction the Sons of the Revolution took charge of it and restored it to its original appearance. The second floor is now an historical museum.



FRAUNCES' TAVERN

Commercial and Financial Buildings. The sky line of commercial New York, seen from a good vantage point on the Hudson, is an extraordinary spectacle, and the effect of the hundreds of towering buildings, crowded together along the narrow island, is one never to be forgotten. The massive structures lining Broadway house some of the greatest business corporations in the world—the Equitable Assurance Society and the Manhattan and Metropolitan Life Insurance companies, the firm of F. W. Woolworth, the Standard Oil Company, the Singer Sewing Machine Company, the Adams and the American Express companies, and many others. The famous Woolworth Building, fifty-five stories above ground, is of special interest to the visitor in New York because of its observation platform, over 700 feet above the ground. The view over Manhattan and its environs from the top of this giant among skyscrapers, the highest building in the world, affords an impressive lesson in geography. (For illustration of the building see ARCHITECTURE panel, page 322.) At the intersection of Broadway, Fifth Avenue and 23rd Street is another famous structure, the well-named Flatiron Building, whose twenty-one stories rise from a narrow, triangular base, giving a peculiar effect of extreme height and slenderness. The Metropolitan Life Building, at Madison Square, is fifty stories high, and, including the tower, is 700 feet above ground level. In the tower is a wonderful clock equipped with chimes that sound the hours and the quarter- and half-hours. At night, by means of an ingenious electrical arrangement, the hours and quarter-hours are also announced by white and red flashes. The minute hand of this clock is seventeen feet in length and the hour hand thirteen and one-third feet, and the figures on the dial are four feet high.

Many other impressive buildings have been erected on the side streets crossing Broadway, such as the white marble Clearing House, on Cedar Street; the Chamber of Commerce, on Liberty Street; and the twenty-six-story building of the Western Union Telegraph Company, on Dey Street. The great financial district of the city also has its architectural glories. Interest, of course, centers in the nucleus of this section—Wall Street. At Number 10, at the head of New Street, stands the great Astor Building; at the corner of Broadway and Wall is the United Bank Building, home of several banking firms and railway companies; at Wall and Nassau is the thirty-nine-story structure of the Bankers Trust Company, the ground plot of which cost $825 a square foot. A new, but comparatively small, building of palatial beauty, at 23 Wall Street, houses the offices of J. Pierpont Morgan & Company, and a few doors away, at Number 30, is the magnificent new Assay Office. Probably the handsomest building in the entire district is the Subtreasury, extending from the Assay Office to Nassau Street. It is built of granite, in Doric style of architecture, and contains a rotunda sixty feet in diameter, the dome of which is supported by sixteen Corinthian columns. The site of this building was formerly occupied by the old Dutch City Hall, and then by Federal Hall, where Washington was inaugurated as first

President of the United States. Mention should also be made of the three-million-dollar home of the New York Stock Exchange, on Broad Street, a thoroughfare which extends south from the Subtreasury; and of the artistic new Custom House, which occupies an entire block at the foot of Broadway, facing a small park called Bowling Green.

Government Buildings. The edifices used by the city for administrative and judicial purposes are in keeping with the great commercial buildings. The offices of the mayor and of various other city officials and the meeting rooms of the board of aldermen are in the old City Hall, a beautiful building begun early in the nineteenth century and completed in 1812. It is in the center of City Hall Park, a small plot of green on Broadway, less than a mile above the Battery. The City Hall is more than an administrative building—it is a museum of historic relics and works of art. The old clock in its tower was destroyed by fire in May, 1917. Facing this structure, on Park Row and Center Street, with Chambers Street running through it, is the magnificent new Municipal Building, twenty-four stories high. In this building are housed the various city departments. It cost about $12,000,000, besides the ground plot, and has several unique features. All of its windows face streets, and its basement contains a station where all the Brooklyn and Manhattan subway lines meet. On the corner of Chambers and Center streets is the $9,000,000 Hall of Records, whose fireproof vaults guard the deeds of all of Manhattan's real estate. The Criminal Courts Building, also on Center Street, is connected by the so-called "Bridge of Sighs" with the great city prison, the Tombs. The latter occupies an entire block and is one of the finest buildings of its kind. At the junction of Park Row and Broadway, facing the Woolworth Building, is the handsome Post Office Building, an imposing example of Doric and Renaissance architecture.

Hotels, Theaters and Clubs. New York is unsurpassed in the number and costliness of its hotels, theaters and clubs, most of which are found in the Broadway-Fifth Avenue district between 30th and 59th streets. The Waldorf-Astoria, on Fifth Avenue, between 33rd and 34th streets, is one of the best known of the first-class hotels. To this group belong such luxurious inns as the Biltmore, Ritz Carlton, Knickerbocker, Vanderbilt, McAlpin, Astor and many others. Among several great family hotels are the Plaza and the Majestic, and a splendid hostelry for women is the Martha Washington, on 29th Street.

New York is universally looked upon by Americans as the theatrical nucleus of their country, for it is the headquarters and producing center of practically all of the great theatrical men and firms—Shubert Brothers, the Frohman Estate, Ziegfeld, Dillingham, Cohan and Harris, and others. New Yorkers and their visitors may find amusement in about fifty standard theaters, in almost as many vaudeville houses and music halls, and in over 800 moving picture theaters. The chief theatrical district is on or near Broadway, between 38th and 62nd streets, and in this section there are probably more theaters to the square mile than in any other section of equal size in the world. These range in size from the so-called "intimate theaters"—the Little Theater, the Bandbox and the Punch and Judy—to the huge Hippodrome on Sixth Avenue between 44th and 45th streets, the shows for which have to be made to order. In the block bounded by Broadway, Seventh Avenue, 39th and 40th streets is the great Metropolitan Opera House, where world-famous stars of grand opera are heard. Of the music halls, the most notable is the Carnegie, at 57th Street and Seventh Avenue. In this edifice, the main auditorium of which holds 3,000 people, are given the season concerts of various choral and orchestral societies.

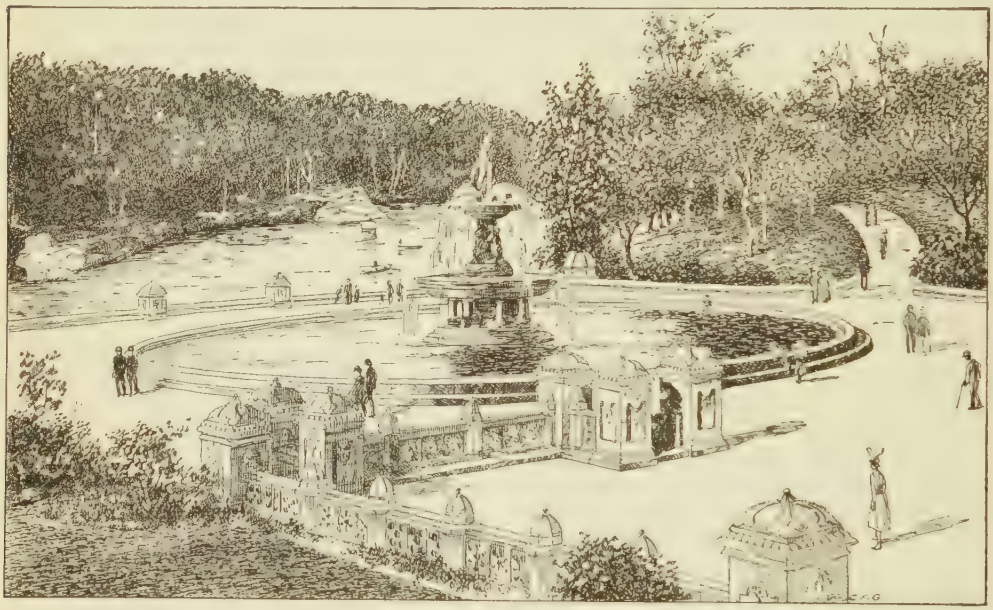
There are over 200 clubs in New York, representing politics, art, religion, history, sports, theatricals, the professions, and other activities. Representative among them are the Union League, the Army and Navy, the Knickerbocker, the Lambs, the Players, the University, the New York Athletic and the New York Yacht. The club homes of many of these organizations are among the city's finest buildings.

Churches. The Protestant Episcopalian is the largest of the Protestant bodies, and preëminent among the churches of this denomination is the Cathedral of Saint John the Divine, on Morningside Heights, overlooking the Hudson. This magnificent edifice, when completed, will be the largest cathedral in the New World. Trinity Church, the parent church of the denomination, is described elsewhere in this article. Second only to Trinity in point of interest is the Church of the Transfiguration, on 29th Street, near Madison Avenue. Because, many years ago, a certain pastor in the neighborhood refused to read the burial service for an actor, but directed the messenger to apply at the

"little church 'round the corner," the Transfiguration has come to be known everywhere as the "Little Church 'round the Corner." Players hold it in special reverence, and it has several beautiful memorial windows to actors. The church is a low building in Gothic style, with vine-covered walls, and is very attractive. Another beautiful Gothic structure of the Episcopal denomination is Grace Church, on Broadway and Tenth. It is one of a group of buildings made of white limestone.

Among the Methodist churches the one of greatest interest is the John Street, for it is built on the site of the first Methodist church erected in America, and is known as the "cradle of Methodism." Other well-known churches are the Saint Nicholas Dutch Reformed (the oldest Protestant denomination in New York), the Fifth Avenue Baptist, the Fifth Avenue Presbyterian, the Broadway Tabernacle (Congregational), All Souls' Unitarian, the Divine Paternity (Universalist), the Holy Trinity (Lutheran), the Jewish Temple Emanuel, the First Church of Christ, Scientist, and Saint Patrick's Cathedral (Roman Catholic). The last named is one of the most ornate cathedrals in America. At 7 East 15th Street is the commodious Y. W. C. A. building; the Y. M. C. A. has its headquarters on 23rd Street west of Seventh Avenue.

Parks. Battery Park, at the southern tip of Manhattan, and several smaller plots of green that freshen the busiest section of the city, have been mentioned in the description of Broadway. Of the larger areas Central Park is the most famous. It stretches along Fifth Avenue for two and one-half miles, from 59th Street on the south to 110th Street on the north, and contains 879 acres. The lawns, flower gardens and wooded areas of this park are among the most beautiful in the world. Among its other attractions are nine miles of roads, twenty-eight miles of walks and over five miles of bridle paths, an imposing promenade



IN CENTRAL PARK

One of the largest of the world's city parks, with a land value of untold millions of dollars, but possessing still greater value as a recreation ground for the people of the crowded city.

—The Mall—a great zoölogical garden much loved by the children, reservoirs and lakes, playgrounds for boys and girls, picturesque bridges, archways and numerous fine statues. Not the least interesting feature of the park is a stately Egyptian obelisk, one of the famous Needles of Cleopatra (see illustration on page 1417). On the Fifth Avenue side is the Metropolitan Museum of Art, the largest institution of its kind in North America. No park in the world is more accessible to a city's millions than is Central Park, and it is frequently visited in a single day by 100,000 persons.

Brooklyn possesses a park which, though not so large as Central Park, is quite as beautiful. This is a great pleasure ground called Prospect

Park. From the summit of its chief elevation, Lookout Hill, one may enjoy a magnificent view over New York Harbor, Long Island, the Palisades and the thickly-settled districts of South Brooklyn, and the park is thus well named. In the Bronx is a park of over 700 acres, famed for its zoölogical and botanical gardens. The wild animals exhibited in Bronx Park have surroundings that are as nearly as possible like those in their native homes, and the landscape settings for both the menagerie and the plants are exceedingly beautiful.

There are two other large parks outside of Manhattan—Van Cortlandt (1,132 acres), at the northern terminus of the Broadway line of the Interborough Subway; and Pelham Bay Park (1,756 acres), on Long Island Sound near Bay-chester. Both have fine golf links, baseball grounds and tennis courts, and Pelham Park has bathing beaches and ample facilities for campers. Bronx, Van Cortlandt and Pelham parks are connected with a boulevard drive. New York residents also have access to a magnificent park along the Palisades of the Hudson. See Palisades, also illustration, in article New York [state]. Among smaller parked areas, of special interest are Riverside Park, of which Riverside Drive is a part, and Morningside Park, laid out on rocky heights north of Central Park between 110th and 123rd streets. One of the beautiful edifices of Riverside Park is the tomb of General Grant, an illustration of which appears in these volumes on page 2572. The Soldiers' and Sailors' Monument, at Riverside Drive and 89th Street, is another imposing structure.

Educational Institutions. Two of the largest universities in the United States are located in New York—Columbia, with its main buildings on Morningside Heights, and New York University, the campus of which is on the east bank of the Harlem River, in the Bronx. (Both of these institutions are described elsewhere in these volumes). Two affiliated colleges—Barnard College (for women) and Teachers' College (for men and women)—occupy sites on the Columbia University campus. Another important institution is the College of the City of New York (see New York, College of the City of), at 138th Street and Convent Avenue. Important institutions under denominational control are Union Theological Seminary (Presbyterian), the General Theological Seminary (Protestant Episcopal), the Jewish Theological Seminary of America, and Saint John's College and the College of Saint Francis Xavier, both under Roman Catholic control. Schools of art, music and the professions and private academies are found in numbers commensurate with the city's population. Cooper Union (described in a subhead under Cooper, Peter) is an institution especially for working people.

Libraries and Museums. Housed in one of the finest library buildings in the United States is the great collection of books, manuscripts and art treasures that constitute the New York Public Library. The structure is of white marble and occupies a prominent site on Fifth Avenue between 40th and 42nd streets. In the Bronx, Richmond and Manhattan there are about fifty branch libraries, and these and the central building contain over 2,000,000 volumes. The central library is as well a great museum of rare books and manuscripts, sculptures, paintings and pottery. Another important public library, but one which is maintained by subscription fees, is the Mercantile, at Lafayette Place and Eighth Street. It has over 230,000 volumes. The public also has access to the reference room of Columbia University Library, where 10,000 volumes are available to readers. Various historical, geographical and professional societies have valuable private libraries, and that of Cooper Union is also important.

The superb buildings and collections of the Metropolitan Museum of Art are described in these volumes under that title. At Central Park West and 77th Street is the American Museum of Natural History, with priceless collections representing all phases of natural history. An important feature of this institution is a free lecture system, for which a hall seating 1,500 is provided. The Historical Society also maintains an interesting museum of historic relics and documents.

Transportation. It is not difficult to understand why the problem of intercommunication in New York has taxed the ingenuity of the most skilful engineers. With the great business interests centered in the lower end of Manhattan, bringing daily into the narrow island space thousands and thousands of workers, it was inevitable that street car lines should be built in the air and underground as well as on the surface. There is now in operation an intricate system of surface, elevated and subway lines, and cross-water traffic is carried on by means of bridges, ferries and tunnels. Thus all portions of the huge New York district have convenient facilities for intercommunication.

The subway system is the most extensive in the world. Previous to 1913 there were two

companies operating the subway lines—the Interborough Rapid Transit and the Brooklyn Rapid Transit. In that year contracts were let for the construction of a dual system, whereby all the rapid transit lines (subway and elevated) operated by the two companies were combined into two great systems covering all the boroughs of Greater New York except Richmond. The greater portion of the lines authorized under the dual contracts were in operation during the year 1917, and these and the old lines in existence are linked together into a mammoth network having its nucleus in Manhattan south of 59th Street. The contracts called for the construction of 44.55 miles of new subway, 53.19 miles of new elevated road, and 19.8 miles of additional tracks on the elevated roads already existing. The cost of construction and equipment of the entire system is estimated to be about $352,000,000.

Another form of local transportation is provided by the Fifth Avenue coach lines. The vehicles are autobusses having seats on top as well as inside, and they afford the visitor a most enjoyable means of seeing the best residential sections, the fashionable shopping districts and the hotel and club centers of Manhattan. The coaches follow one another at brief intervals, and traverse Fifth Avenue, Riverside Drive and other interesting streets and boulevards.

Bridges. The first of the great bridges over the East River was completed in 1883 (see Brooklyn Bridge), and at the time it was considered the finest suspension bridge in the world. It connects City Hall Park, in Manhattan, with Sands Street, Brooklyn. Since the completion of the Brooklyn Bridge several other mammoth passageways have been built across the East River—the Queensboro, a cantilever structure stretching from East 59th Street and Second Avenue, Manhattan, across Blackwell's Island to Jane Street, Long Island City; the Williamsburgh, from Clinton and Delancy streets, Manhattan, to Havemeyer Street and Broadway, Brooklyn; the Manhattan (see illustration, page 922), between the Bowery and Canal Street, Manhattan, and Nassau and Bridge streets, Brooklyn. Both the Williamsburgh and the Manhattan bridges are of the suspension type (see Bridge). The most remarkable and latest feat in bridge building, however, was the construction of an immense railroad bridge over the channel known as *Hell Gate* (see illustration on page 2764.) This gigantic structure, which was opened for traffic in January, 1917, extends from East 141st Street, the Bronx, across Randall's and Ward's islands to Astoria, Long Island. It was designed to connect the Pennsylvania and the New York, New Haven & Hartford systems, so that through passengers could proceed on transcontinental journeys without changing cars. It is the heaviest bridge in the world, and cost $25,000,000, including approaches.

Several fine bridges also span the Harlem River, notably the Washington, a massive cantilever structure connecting Manhattan and the Bronx, and High Bridge, which carries the old Croton Aqueduct (see Aqueduct).

Tunnels. The construction of the various tunnel systems under the Hudson and the East rivers has immeasurably improved both the local and the general railway service. Though ferries still operate from Manhattan to Brooklyn and to Long Island City, and between Manhattan and Staten Island and various New Jersey points, they are being gradually replaced by the more convenient tunnels. The first tunnels in New York, opened for traffic in 1908, were constructed by the Hudson & Manhattan Company to provide transportation between Manhattan and Jersey City. At the present time this company operates two single-track tubes (the north tunnels) under the Hudson from Jersey City to Martin Street; up-town tunnels connecting with the north tunnels and extending to Sixth Avenue and 33rd Street; the south tunnels, consisting of two tubes which extend under the Hudson from Jersey City to the company's magnificent Terminal buildings at Cortlandt, Church and Fulton streets; and two single-track tubes extending from the Hoboken terminal of the Lackawanna Railroad to Washington Street, Jersey City, with connections to the north and south tunnels and the Pennsylvania Station. The Pennsylvania Company operates two tubes under the Hudson and four under the East River, and cross-town tunnels from the Pennsylvania Station across Manhattan under 32nd and 33rd streets to First Avenue. There is a two-tube system connecting the Manhattan and Brooklyn subways, extending under the East River from the Battery to Joralemon Street, Brooklyn, and another subway connects Brooklyn and Coney Island, at the southwestern end of Long Island. What is known as the Belmont Tunnel is operated by the New York & Long Island Railroad and runs under the East River from 42nd Street, Manhattan, to Long Island City. Several new tunnels under the East River are also being

constructed in connection with the subway extension.

Railway Lines. All of the roads approaching New York from west of the Hudson except the Pennsylvania system have terminal stations in New Jersey, and their passengers continue the trip to Manhattan by ferry boat or by trains which run through the river tunnels. These roads are the Erie, the West Shore, the New York, Ontario & Western, the Lackawanna, the Philadelphia & Reading, the Lehigh Valley, the Central of New Jersey and the Baltimore & Ohio. The main station of the Pennsylvania Company, used by several systems and occupying two entire blocks in Manhattan (Seventh Avenue, 32nd, 33rd streets), is a structure of magnificent proportions, second only to the Grand Central. Trains from the west approach it by way of twin tubes which extend through Bergen Hill in New Jersey, pass under the Hudson River and then beneath the streets of New York City. The New York Central & Hudson River, the New York & Harlem River and the New York, New Haven & Hartford railroads all approach New York from the north and make use of the Grand Central Terminal at Park Avenue and 42nd Street. This station, too, is an example of noble and impressive architecture. No steam locomotives are permitted on Manhattan Island, and trains coming into the island are propelled by electric power.

Commerce. New York is one of the great trade centers of the world, both for domestic and for foreign commerce. Its supremacy as a commercial center was assured in 1825 with the completion of the Erie Canal, now a part of the New York State Barge Canal (which see). The year before the outbreak of the War of the Nations forty-seven per cent of the total foreign trade of the United States passed through the port of New York (which includes all the municipalities on the Hudson and on New York Harbor), and in normal years it imports practically all of the silk goods and furs sent into the country, and the greater part of the cotton and linen manufactures, jewelry, gems, chemicals, coffee and cocoa. Over 4,000 vessels engaged in foreign trade clear the port each year in times of peace, and the volume of coastwise trade is even heavier.

There are ample facilities for taking care of shipping. Ocean vessels approach the harbor from the southeast through the recently completed Ambrose Channel off Sandy Hook, and from the northeast through Long Island Sound and the East River. Obstructions in the Hell Gate channel (see HELL GATE) were removed many years ago by blasting. All approaches to the harbor are well guarded, the principal fortifications including Fort Hancock on Sandy Hook, the forts at the Narrows (on Long Island and Staten Island), and fortifications on Governor's Island, south of Manhattan. Greater New York has a total water front of 341.22 miles. On the west side of Manhattan Island there is practically a solid line of docks and piers extending about four miles.

Manufactures. New York is by far the most important manufacturing city in the United States, and a detailed discussion of its various industries would in itself fill a volume. There is hardly an article used in everyday life or in business that is not made in this city. Its most extensive line of manufacture is men's and women's clothing; some idea of the magnitude of this industry may be gained from the statement that the clothing produced has a value in excess of that of all the products of any other American city, with two exceptions. Another industry in which New York far outranks any other American city is the printing and publishing business. Many of the industrial firms having office headquarters in Manhattan operate their factories in the outlying towns of the state and in New Jersey and Connecticut; within a radius of fifty miles there are more than 25,000 manufacturing enterprises.

Government. Greater New York is governed by a charter which went into effect on January 1, 1898, and was amended in 1901. Executive power is vested in the mayor and the heads, or presidents of the boroughs, all of whom are elected for four-year terms. The mayor has extensive powers of appointment and removal, he is chairman of the board of estimate and apportionment, which alone can grant franchises, and he has complete veto power over such grants. The borough presidents preside over local boards, have control of such matters as street paving and grading, sewers and public baths, and each one has the power of appointment and removal of the superintendent of the borough bureau of buildings. The board of aldermen, consisting of seventy-three members, is elected for two years; each alderman is elected by a separate district, but the president of the board is elected by the city as a whole. Laws may be passed over the mayor's veto by a two-thirds vote, except in case of payments of money, when a three-fourths vote is required. The city has seventeen administrative depart-

ments, and an annual budget in excess of that of any other city in the world. The mayor receives a yearly salary of $15,000.

History. The region about New York City was visited in 1524 by the Italian navigator Verrazano, and in the following year a Spanish

EARLIEST KNOWN VIEW OF NEW YORK
Joost Hartger's view of Nieuw Amsterdam; from a book printed in Amsterdam in 1651.

vessel commanded by Gomez sailed into the bay. The real history of the city, however, begins with the expeditions of Henry Hudson (which see), who explored the harbor and river in 1609, while in the service of the Dutch East India Company. It was not long before the Dutch began to make permanent settlements, and in 1614 Fort Manhattan was built by a trading company on the site now occupied by the Custom House. New York City thus began at the foot of Broadway. A second company, the West India, was chartered in 1621. Five years later, Peter Minuit, who had been appointed governor by the company, bought all of Manhattan Island from the Indians for goods valued then at $24. Fort Manhattan was torn down to make room for Fort Amsterdam, and within the latter was erected the first church building on the island. The settlement, which had a population of less than 200, was called New Amsterdam. By 1653 its population had increased to 800, and in that year it was incorporated as a city.

New Amsterdam passed under the control of the English in 1664, and received the name New York. Though the Dutch regained it in 1673 and named it New Orange, it was recovered by the English the following year, Sir Edmund Andros (which see) becoming governor. From this time on the town was known as New York, and it grew steadily in population and importance. The first city charter under the English was issued in 1686. Seven years later the first printing press was set up, in 1696 the original Trinity Church was built, in 1700 the first library was opened, and in 1703 the first free school began its sessions. The *Gazette,* the first newspaper of a city that now publishes several hundred, began to circulate in 1725. A fire department was organized in 1731, and a year later stage service was established between New York and Boston.

Throughout the stormy period before and during the Revolutionary War, New York stood loyally for the colonial cause. Here, in 1765, was held the Stamp Act Congress (see STAMP ACT). During the war, from 1776 to 1783, the city was occupied by British troops, and a large part of it was destroyed by fire in 1776. After the national government was organized Congress held its sessions in New York from 1785 to 1790 (see CAPITALS OF THE UNITED STATES), meeting in the old Federal Hall whose site is now occupied by the Subtreasury. When the first Federal census was taken (1790) the city had a population of 33,131, and its limits extended northward to the present southern boundary of City Hall Park. Some of the great milestones in its history since that time have been the opening of steamboat service between the city and Albany (1807); the completion of the Erie Canal (1825); a great fire of 1835; the

IN 1674
Blockhouse and city gate, now the foot of Wall Street.

completion of the old Croton Aqueduct (1842); the rule of the Tweed Ring (broken in 1871); the opening of Brooklyn Bridge (1883); the unveiling of the Statue of Liberty (1886); and the organization of Greater New York (1898). T.E.F.

BOOKS RELATING TO THE CITY. An accurate and interesting picture of the life of the poorer classes in New York has been presented by Jacob A. Riis in his *How the Other Half Lives* and *Battle with the Slum;* other descriptive books include Hemstreet's *Nooks and Corners of Old New*

RESEARCH QUESTIONS ON NEW YORK CITY

(An Outline suitable for New York will be found with the article "City.")

What does the name of Wall Street immediately suggest? Fifth Avenue?

Where is Castle Garden? What important events have taken place there? What would you find there to-day?

Where are the Palisades? Describe them. What memorial to a great man is to be found in Riverside Park?

What enterprise assured the supremacy of New York as a commercial center? Which is heavier, the coastwise or the foreign trade? How much?

In what sense can New York be called the largest city in the world?

On an average, how many immigrants enter New York each day in normal times?

What is the "Great White Way?"

What were the original geographical limits of the city? How does Greater New York differ from this earlier city?

How many islands are included in the city? Name them. Tell for what at least two of them are famous.

How is the harbor of the city guarded? Describe the most conspicuous object to be seen in the harbor bay.

Why is the arrangement of streets on lower Manhattan Island so irregular and confused?

What is the Bowery? How has its character changed? What class of people makes up the greater part of its population?

What famous church is at the very commercial center of the city? Name some great Americans who are buried in its cemetery.

For what is the Jumel mansion famous? How long has it been in existence? What well-known poem is connected with it?

What is the highest building in the world?

Describe New York's gigantic clock. Where is the "Bridge of Sighs?"

What is the "cradle of Methodism," and why is it so called?

Describe the city's most famous park. What are Cleopatra's Needles? About how old are they? How long has New York possessed one?

Name two important universities which are located in the city. For what class of people was Cooper Union founded?

Why has the transportation problem of New York been a particularly difficult one? How has it been solved?

Of what type was the first great bridge over the East River? What are the peculiar features of this type?

What is Hell Gate, and why is it so called? What has been done to make the name less applicable?

Where are the terminals of almost all the great railroads which enter New York from the West?

Why are no soot and smoke from locomotives observable on Manhattan Island?

What sweeping statement may be made about the scope of New York's manufactures?

What assistants has the mayor in the discharge of his executive duties?

To how many nations has the territory on which New York is situated belonged?

How large an area of what is now the most valuable real estate in the world was bought for twenty-four dollars?

York, Jenkins' *Greatest Street in the World* and Van Dyke's *New New York.* Henschel's *Municipal Consolidation: Historical Sketch of Greater New York* is a standard work on the city's government. For its history consult Colton's *Annals of Old Manhattan;* Earle's *Colonial Days in Old New York;* Hemstreet's *The Story of Manhattan* and *Wilson's New York, Old and New.* A classic is Irving's *Knickerbocker's History of New York.*

NEW YORK, College of the City of, a free college for men, maintained by the city of New York. It was established by the board of education upon the vote of the city, in 1848, as the Free Academy. The purpose was to make it possible for ambitious students without funds to receive college training. In 1866 the school was raised to collegiate rank and became the College of the City of New York. High academic standards are maintained. Seven years of instruction are offered; three are preparatory and four are collegiate. The preparatory courses are the same as those given in the city high schools. There are no professional or graduate courses. Tuition, textbooks and apparatus are free. Students must take prescribed courses until they have completed the sophomore year.

In Townsend Harris Hall, the preparatory department of the college, is conducted a night school, largely attended by boys and men who have been unable to complete their high school work in the day schools. The teachers of the city may also complete courses at the college, which relieves them of taking certain examinations given by the city board of education. In 1908 the college was moved to its present location on University Heights. The magnificent buildings and equipment there were furnished by the city at a cost of $5,000,000. The annual expenses are covered by an appropriation of approximately $600,000, supplied by the city. The faculty consists of about 300 members. There are about 14,000 students enrolled, including those in the preparatory department and in the evening schools. The library contains nearly 62,660 volumes.

NEW YORK, University of the State of, a state department of public education in New York. It includes all schools under the control of the board of regents, the members of which are a governing and examining body for the secondary, higher and professional school system of the state. This system is explained in the article New York, subhead *Education.*

NEW YORK STATE BARGE CANAL, a system of waterways resulting from the improvement and enlargement of four canals in operation in the state of New York—the Erie, the Champlain, the Oswego and the Cayuga and Seneca canals. After the close of the War of Secession the state canals began to feel the effects of the rapid development of the railroad systems; their business declined, and for a long time public interest in artificial waterways was at a low ebb. There were, however, enough advocates of canal improvement in the state to make their influence felt, and the matter of enlarging and improving the waterways was considered in the legislative session of 1891. The following year a commission was appointed which reported in favor of the project, and in 1895 bonds were issued to cover the estimated expense of $9,000,000.

It was decided to deepen the Erie and Oswego canals to nine feet, and the Champlain to seven feet; the work was expected to increase the capacity of boats one-third. The improvements actually made, however, fell so far short of what was necessary to create an efficient waterway system that the whole subject was thoroughly canvassed by a commission of experts. As a result a bond issue of $101,000,000 was authorized by the legislature and ratified (November, 1903) by popular vote, and a comprehensive scheme of improvement agreed upon.

Details of Construction. This plan provided for 446 miles of improvement or new construction, and the canalization of 350 miles of lakes and connecting rivers; the total length, therefore, of the system known as the Barge Canal is 796 miles. Work was begun in 1907 and the entire canal was completed and ready for operation in 1917. Of the four waterways which form the basis of the system the Erie Canal (which see), connecting Buffalo, on Lake Erie, with Troy and Albany on the Hudson River, is the longest, with a total length of 339 miles. The Champlain Canal, between Whitehall on Lake Champlain, and Watervliet, near Troy, is sixty-one miles long. Next in length is the Oswego, between Oswego on Lake Ontario, and Syracuse on the old Erie Canal. It is twenty-three miles long. Finally, there is the Cayuga and Seneca Canal, twenty-three miles in length, extending from Montezuma, on the Seneca River and the Erie Canal, to lakes Cayuga and Seneca. The relative position of these branches of the Barge Canal is shown in the accompanying illustration. Nearly half the area of New York State is within twenty miles of the waterways.

The channel of the Barge Canal is at no place less than twelve feet deep; in earth sections

MAP OF NEW YORK STATE BARGE CANAL
(*a, a*) Erie Canal; (*b*) Champlain Canal; (*c*) Oswego Canal; (*d*) Cayuga and Seneca Canal.

of the land line it is 125 feet wide and in rock cuts ninety-four feet wide. Wherever possible it follows natural watercourses, and in the beds of rivers and lakes is 200 feet wide. There are thirty-five locks on the Erie branch, eleven on the Champlain, seven on the Oswego and four on the Cayuga and Seneca. These locks, which are built entirely of concrete, have a standard length of 328 feet, a width of forty-five feet, and can admit boats having a tonnage of from 1,500 to 3,000. Two boats of about 1,500 tons each can be locked at one time, or can pass each other at any point along the canal. There are forty dams in connection with the system, those at Delta and Hinckley forming huge reservoirs. The former has a capacity of nearly 2,750,000,000 cubic feet, and the latter of about 3,500,000,000. Vischer's Ferry Dam, which is nearly 2,000 feet long, raises the water level in the Mohawk River, and near Schenectady movable dams have been constructed, which can be raised and lowered to regulate the height of water.

Commercial Importance. The original estimated cost of $101,000,000 was exceeded by $49,000,000, but there is abundant promise that the vast expenditures for this great public work will be entirely justified. With its present facilities it can easily become a powerful asset to the commerce of the country. For years past millions of bushels of grain from the wheat fields of the Northwest have been carried over the Great Lakes through Canadian canals and rivers to Montreal, and from there shipped to Liverpool. The completion of the Barge Canal will undoubtedly place in the hands of American shippers that part of the carrying trade which naturally belongs to the United States. Moreover, vessels carrying over 30,000 bushels of grain, and operated in fleets, are able to reduce the time required to transport grain by water from Buffalo to New York at least fifty per cent, with a proportionate decrease in charges. It is estimated that it costs the canal management only twenty-six cents to transfer a ton of freight from one of these cities to the other, and it is expected that the canal system will eventually have an annual capacity of twenty million tons. The construction of the Barge Canal is considered the beginning of a new chapter in the economic development of America. See CANAL. T.E.F.

Consult Hepburn's *Artificial Waterways of the World.*

NEW YORK UNIVERSITY, one of the largest and most important coeducational universities in the United States, located in New York City. It was founded in 1831 through the influence and efforts of a group of prominent New York men. The original purpose and policy of the institution was to bring the broadest education possible within reach of all the people. For this reason the various departments are not all on one campus.

(1) At University Heights, in upper New York, are the college of arts and pure science, the school of applied science and the summer school. One of the most interesting in this group of fourteen buildings is the Memorial Library, in which is the Hall of Fame (which see).

(2) Downtown, in the great University building at Washington Square, are the graduate school, the school of pedagogy, the school of commerce,

accounts and finances, the Washington Square collegiate division and the women's law class.

(3) In 1898 the medical school of the university was united with the Bellevue Hospital College, at First Avenue and Twenty-sixth Street.

(4) The New York American Veterinary College is located at 141 West Fifty-fourth Street.

Besides, there are university courses given in various places which are designed to be of special benefit to people who cannot take the work within the university walls.

The tuition is about $125, except in the medical college, in which it is $200. In the various libraries of the university there are 115,000 volumes. There are about 625 instructors and over 13,000 students.

NEW ZEALAND, *ze'land,* a lovely, mountain-covered land of the South Seas, one of the most prosperous and progressive of countries, and the most lonely in situation of any large body of land in the world. Its two islands lie in the latitude of the southern half of Chile, 1,200 miles east of Australia (two-thirds as far away as Newfoundland is from Ireland), and more than 5,000 miles from any other land except small islands and the ice-bound Antarctic continent. New Zealand is not so small as it appears to be from a casual glance at the map. Its area is larger than that of Great Britain, its mother country, for it contains 103,861 square miles; it is almost exactly as large as Colorado, but only two-fifths as large as the Canadian province of Alberta.

The People. Before the white man's day New Zealand belonged to a brown race called *Maoris,* or, as the word is spelled in old whaling stories, *Mowrees,* who seem to have reached there about five centuries ago from Samoa, traveling the 1,600 miles in war canoes. Now, however, the population is almost entirely European, for of the 1,218,921 inhabitants (1921) only 50,000 were Maoris. At the census of 1921 there were also 12,500 Cook Islanders and 2,630 Chinese. Of the white people seven in every ten were born in the islands, and nearly all the rest were immigrants from the British Isles.

Their Remarkable Laws. Placed as they are, so remote from Old World influence—New Zealand is exactly on the opposite side of the globe from Spain—the New Zealanders have won admiration for their courage in adopting advanced legislation. Many of their laws were at first unnoticed or scoffed at in Europe and America; soon other nations began to pass similar legislation.

In 1876 the government adopted its first land tax, which was repealed three years later; but in 1891 the measure was revived and is still in force. It is succeeding in its purpose, which is to break up large estates and make the land available for settlers by a tax which increases in rate as land holdings increase in value, in effect freeing five-sixths of the landowners, and those of the poorer classes, from all charges. The tax is on land only, not on improvements, and there is an especially heavy tax for absentee owners. In 1892 the government adopted the policy of purchasing estates from owners who grumbled at taxes, and then, instead of selling the lands so acquired, leased them in parcels of 2,000 acres, or less, for 999 years. In 1907 and 1908 the longer-lease term gave way to one of only sixty-six years, with right of renewal at a new rate The tenant, if he wishes, may pay the government as much as ninety per cent of the price of his land, so as to reduce his rent, but he cannot purchase it outright. (For discussion of the theories which prompted New Zealand's action, see SINGLE TAX.)

There has been public ownership of railroads in New Zealand for over fifty years, and national ownership since 1870. An income tax was adopted in 1891, the vote for Parliament given to women (who had long before had municipal franchise) in 1893, arbitration of labor disputes was made compulsory in 1894, old age pensions were granted in 1898, a universal minimum wage was established in 1899, and participation in strikes was declared an offense punishable by fine in 1908. Among the institutions created and owned by the government,

some of them more than forty years old, are a farm to teach agriculture to the unemployed (of which there are now very few), a life insurance company and a fire insurance company which compete with private corporations, a Public Trustee's office for handling estates of deceased persons, farmers' banks, collieries and a sawmill.

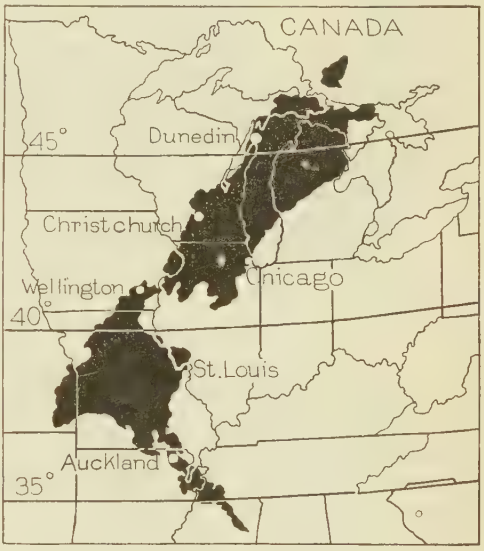
The state also conducts the telegraphs and telephones, owns the rights to the cyanide process (see GOLD; SILVER), has a monopoly on "trading stamps," inspects and grades butter, hemp, meat and other exports, advances money to settlers and builds houses for workmen or lends money to them for building. In constructing railroads and other public works the government allows coöperative contracting; that is, a number of laborers may band together, undertake a contract and share the profits. All earnings of the railroads in excess of three per cent are given back to the people in concessions, such as free rides to school children and free transportation of fertilizers.

The Schools. As would be expected in such an advanced land, education is well provided for. All children between seven and fourteen years of age must go to school, and there are plenty of opportunities both for them and for older students. The primary schools are directed by the Education Department, but there are local boards and school committees. High schools, technical day schools, schools of mines, normal schools, art schools and industrial schools are provided for the white children, and there are over 100 day schools and boarding schools for the Maoris. There are four colleges in the four largest cities, all of them affiliated with the University of New Zealand, which is supported by the government solely as an examining institution. There is also an agricultural college.

The Cities. In spite of the steady settlement of the land since the adoption of the land tax and other measures to break up the estates, half the people of New Zealand live in towns, and about four-tenths of them in and about the communities of over 10,000 population. There are nine of these larger towns. Auckland, which with its suburbs has over 157,000 people, is the first of them, but Wellington, the capital, has 107,500, Christchurch 105,670 and Dunedin 72,255. The first two are on the northern island, the latter two on the southern.

The Land. One of New Zealand's leading citizens, William Pember Reeves, has written that among the sounds most familiar to his countrymen's ears are the hoarse brawling of torrents and the deep roar of the surf of the Pacific, borne miles inland on still nights. Snow-capped and glacier-robed mountains, volcanoes and geysers and hot springs, rugged cliffs and winding fiords make the country vastly different from the Zeeland for which it was named by its Dutch discoverers. Nowhere is the sea more than sixty miles distant, for both North Island and South Island, each of which contains about half of the whole dominion, are long and narrow.

All of the volcanoes are in North Island, which is the smaller of the two. Some of their cones rise 9,000 feet above the sea, but between them are only foothills, and the real mountain ranges are in South Island. Here, hugging the



LATITUDE AND AREA: A COMPARISON

In the above map New Zealand, which is in the Southern hemisphere, is folded over upon corresponding latitudes in the Northern hemisphere; therefore the directions, as they properly relate to New Zealand, are reversed. The northern point of New Zealand is as far south of the equator as Northern Mississippi is north of it; the southern tip is farther south of the equator than the Strait of Mackinac is north of it. When it is winter in New Zealand it is summer in the United States and Canada, but neither summer nor winter is so extreme as in America.

west shore, are the Southern Alps, an unbroken range of majestic peaks perpetually clad in white. East of them the land descends gently to the sea, in foothills and plains. Four of the rivers of North Island are navigable to its very center, and the Clutha, at the extreme south end of South Island, though only 220 miles in length, is said to discharge nearly as much water as the Nile.

NEW ZEALAND, AWAY FROM THE CITIES

Native Method of Greeting

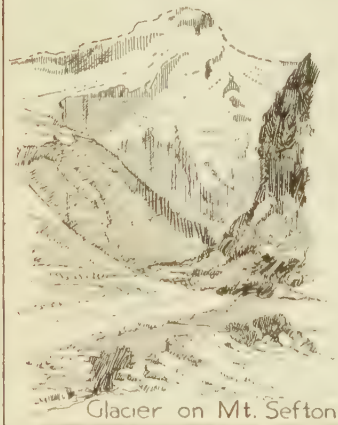
Best Type of Native Boat

Interior Village

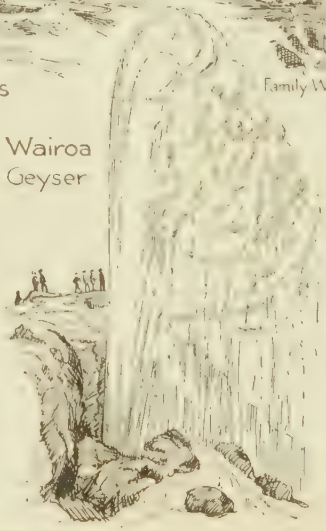
Weaving

Hurdle Race in Boats

Family Washing Done in Hot Spring



Glacier on Mt. Sefton



Wairoa Geyser

A Maori Princess

Its Climate. Though one end of New Zealand is as far from the equator as Canada, and the other extreme is as near to it as Morocco, its weather is unlike that of either. At Auckland, in the latitude corresponding to southern Virginia, the mean temperature in midsummer (January) is 66.6°, about that of Duluth, Minn., in July, while six months later, in the cold season, the thermometers register 51.4°, which is about the temperature of San Antonio, Tex., in January. The rainfall at Auckland is forty-two inches each year, about as great as in New England. At Christchurch, east of the Alps, it is only twenty-five inches, about as in western Ontario, but on the steep western slopes it is four times as great. There are, however, more hours of sunshine in New Zealand than in Italy.

Plants and Animals. When the English arrived, much of the country bore evergreen forests, in which palms and ferns, large and small, formed part of the dense undergrowth. There were many beautiful birds, but among all the animals there were none which nursed their young. Insects were few, and snakes were entirely lacking.

Among the animals introduced into South Island from England were two rabbits, brought in 1859 by one who hoped to indulge in rabbit hunting. Twenty years later their countless descendants were eating so much grass that millions of acres of sheep land had to be abandoned. Only after years of government-supervised struggle, including the building of hundreds of miles of wire fence, was the pest controlled. In 1893, the climax of the fight, 17,000,000 rabbit skins were exported; fifteen years later the number was 3,000,000. The introduction of sheep has resulted more fortunately, for now one-third the value of New Zealand's exports (which in proportion to the population are exceeded in all the world only by those of the nation which includes old Zeeland) is in wool.

Industry. Practically all the islands' exports are raw materials. After wool the important articles are frozen meat; butter and cheese; gold; hides, skins and leather; fiber; tallow; *kauri* gum; grain and flour. The fiber is that of the so-called New Zealand flax (see FLAX). *Kauri* gum, or resin, is obtained either from live trees or by digging on the sites of ancient forests. The exports of *kauri* timber were once very large, but now lumber is imported. So mercilessly have the wonderful forests been exploited that it is estimated that only fifty years' sup-

Outline and Questions on New Zealand

Outline

I. Position and Size

(1) Isolated situation
(2) Distance from other lands
(3) Size
  (a) Actual
  (b) Comparative

II. The Land

(1) Mountains
  (a) Volcanoes
(2) Rivers
(3) Climate
  (a) Compared with other countries in similar latitudes
(4) Plant and animal life
  (a) Native forms
  (b) Introduced forms

III. The People

(1) Races
  (a) The Maoris
  (b) Europeans
(2) Population
(3) Industries
  (a) Mining
  (b) Agriculture
  (c) Stock growing
(4) Progressiveness shown by
  (a) Very advanced laws
  (b) Schools

IV. History and Government

(1) Discovery
(2) Earliest settlement
(3) Growth and union
(4) Relation to Great Britain

Questions

Who were the first inhabitants, so far as is known, of these islands?

What is the distance between New Zealand and the nearest large body of land?

What was the purpose of the first land tax?

What peculiar system of leasing land is in effect?

How long has woman suffrage been practiced?

Why is the farm for teaching agriculture to the unemployed no longer as important as formerly?

Mention several functions of the government which governments elsewhere frequently leave to private companies.

In what physical features do the islands resemble Iceland?

What remarkable fact can you give about the volume of New Zealand's largest river?

What peculiarity did the early explorers notice about the animal life?

What animal, introduced from England, became within a few years a serious pest?

In what way are the wheat fields of New Zealand remarkable?

What other dependency of Great Britain bears the same relation to the mother country as does New Zealand?

ply remains, yet reforestation with native trees is limited by the fact that they require from 150 to 3,600 years to mature.

New Zealand's wheat fields are the most wonderful in the British oversea dominions. The lowest yield of the present century was 24.76 bushels per acre in 1901, the greatest 38.87, in 1902. The average for twelve years is nearly 31 bushels, a figure equaled only once in Alberta, never in Saskatchewan and only occasionally in the irrigated regions of the United States. However, production is on a small scale, for the annual crop of 6,000,000 bushels is no greater than in the tiny Netherlands.

History and Government. After Abel Tasman visited *Nieuw Zeeland* in 1642 no voyager reached its shores till Captain Cook's voyage in 1769. A month later came the French navigator, De Surville. Though there were soon English settlements in all parts of the islands, not till 1839 was the British government persuaded to appoint a governor. There were seven distinct colonies until 1853, when a single constitution was given them. There has been little trouble with the Maoris in the last fifty years, but previously their warlike spirit caused frequent conflicts.

Since 1907 New Zealand has been a Dominion, and it bears exactly the same relation to Great Britain as does Canada. The governor sent from England coöperates with the General Assembly, which consists of an appointed Legislative Council of thirty-nine, and an elected House of Representatives with eighty members. A treaty of 1840 with the Maoris has been faithfully kept, and the natives have four representatives and 12,000 voters. The Dominion includes Chatham Islands, 536 miles east, and several smaller islands at an equal distance, and since 1901 it has administered the government of the Cook Islands.

In the War of the Nations New Zealand gave remarkable proof of its loyalty to the British Empire. By June, 1917, one person in eleven in the Dominion had enlisted for service; this was a greater proportion than had joined the colors from any other part of the empire, excepting England alone. C.H.H.

Consult Douglas's *The Dominion of New Zealand;* Lloyd's *Newest England;* Lusk's *Social Welfare in New Zealand.*

Related Subjects. The reader interested in New Zealand is referred to the following articles in these volumes:

Auckland	Christchurch
Butter	Cook, James
Cheese	Dunedin
Gold	Single Tax
Maoris	Wellington
Meat and Meat Packing	Wool

NEY, *nay,* MICHEL, DUKE OF ELCHINGEN AND PRINCE OF THE MOSKVA (1769-1815), a marshal of France who so distinguished himself in the service of Napoleon that the latter honored him with the title "Bravest of the Brave." Ney was the son of a cooper of Saarlouis. At the age of nineteen he joined a regiment of hussars at Metz, and in the campaign of 1792, when the French Army of the North defeated the allied Prussians and Austrians, he showed himself far above the average in energy and valor. In 1804, when the French Empire was proclaimed, Napoleon made him marshal of France. Ney defeated the Austrians at Elchingen in 1805 (receiving for this exploit the title Duke of Elchingen, in 1808), took part in the battles of Jena and Eylau, and in 1807 captured the village of Friedland from the Russians. It was this latter triumph that inspired Napoleon to call him *Brave des braves.*

MARSHAL NEY
Intense devotion to his emperor brought him to his death facing a firing squad.

For his services in the disastrous Russian campaign he was awarded the title Prince of the Moskva, and he proved himself invaluable during the terrible retreat from Moscow. Though he approved of Napoleon's abdication after the fall of Paris and tendered his services to the Bourbons, he rejoined his former commander when Napoleon returned from Elba, and it was Ney who led the last charge of the Old Guard on the field of Waterloo. Condemned to die on the charge of treason, he was shot in the gardens of the Luxembourg.

NEZ PERCÉS, *na per sa',* a peaceable tribe of Indians found in 1805 by Lewis and Clark while on their famous trip into the Northwest (see LEWIS AND CLARK EXPEDITION). They called these Indians Chopunnish, but the source of this name is unknown. Nez Percés, meaning *pierced noses,* was a name given by the French to tribes accustomed to piercing the nose, as many other people pierce their ears, in order to wear ornaments there, but it is not known that this tribe had such a custom.

They lived in what is now the southeastern corner of Washington, northeastern Oregon and western Idaho, in mountain valleys and along the banks of the Snake River. Their principal food was game, salmon, roots and berries, and they did not engage in agriculture.

This tribe of Indians was usually friendly to white men. When gold was discovered in the Oregon mountains, the United States endeavored to make a new treaty with the Nez Percés, who had already been confined to the Lapwai reservation in Idaho. They refused the terms, and in 1877, under their chief, Joseph, defeated United States troops in a number of skirmishes. During this war Joseph commanded his braves not to harm a white man who was not in the quarrel. He was finally overcome and attempted to retreat into Canada, but was surrounded, and he and his people, who thought they were going back to their old reservation, were taken to Indian Territory. So many of them died there that in 1884 they were sent north to Colville reservation, in northern Washington. There are fewer than 2,000 of this tribe now living, and these are to be found in the two reservations in Washington and Idaho.

NIAG'ARA, known as NIAGARA-ON-THE-LAKE to distinguish it from the city of Niagara Falls, is a town in Lincoln County, Ontario. It is situated on Lake Ontario, at the mouth of the Niagara River, and is on the Michigan Central and the Niagara, Saint Catharines & Toronto railways. For a century it has been one of the most popular summer resorts in Canada, not alone because of the beauty of its vicinity but also for its historical associations. Under its former name of Newark it was the first capital of Upper Canada (1791-1796), and Navy Hall, the residence of Governor John Graves Simcoe, still stands. In the War of 1812 many battles were fought near the town, notably that of Queenston Heights, and the town itself was burned by the Americans in December, 1813. Population in 1911, 1.318; in 1921, 1,357.

NIAGARA FALLS, formerly known as CLIFTON, or SUSPENSION BRIDGE, is a city in Welland County, Ontario. It is situated on the west bank of the Niagara River, just below the great Falls, and is twenty-four miles northwest of Buffalo. The city's most conspicuous feature is Queen Victoria Park, which has an area of 154 acres. It is one of the finest parks in the world, and commands a magnificent view of the Falls. This is the center of the splendid boulevard system which extends from Lake Erie to Lake Ontario.

In addition to its attractions for tourists, the city is important as a railway and transportation center. The river at this point is crossed by three bridges, connecting the town with the city of the same name in New York. Practically all of the great Eastern trunk lines of railway, including the Grand Trunk, Canadian Pacific, Canadian Northern, Michigan Central, Lake Shore & Michigan Southern, Wabash and Erie either enter the city over their own tracks or have direct connection. Since the Falls have been harnessed and made to yield electric power, manufacturing has greatly increased. The principal industrial establishments produce cereal breakfast foods, graphite, cyanide, silverware, iron and steel, leather and leather goods, paper boxes, hosiery, hats and suspenders. Population in 1911, 9,248; in 1921, by Dominion census, 14,764.

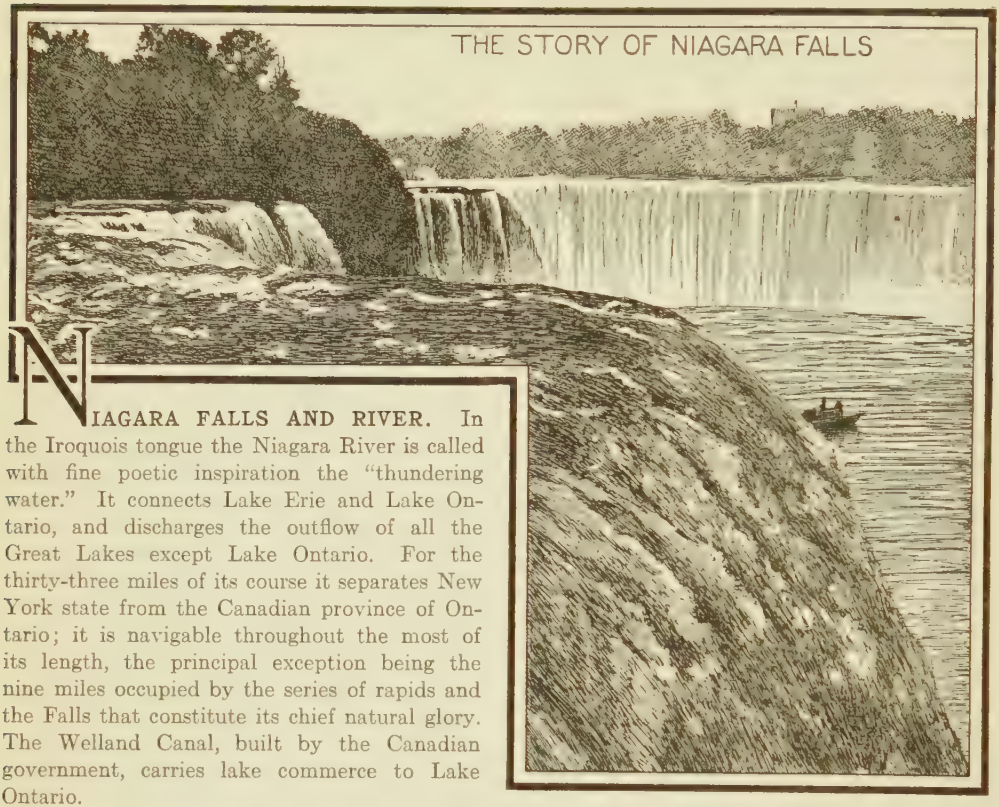
NIAGARA FALLS, N. Y., a famous scenic resort and industrial center in Niagara County, situated along cliffs above the Niagara River from the Falls to a point three miles below. Two steel-arch bridges and a cantilever bridge span the river between the city and the Canadian city of the same name. Niagara Falls is served by the Erie, the Lehigh Valley, the Michigan Central, the New York Central and the West Shore railroads, and by the International and other electric lines. Its area exceeds nine square miles. In 1910 the population was 30,445; in 1920 it had 50,760, a gain of 67 per cent in ten years.

Niagara Falls contains the Niagara University (Roman Catholic) and De Veaux College (Protestant Episcopal), a Federal building erected in 1908 at a cost of $125,000, a public library building given by Andrew Carnegie, the Niagara Falls Power Company building and Niagara Falls and Mount Saint Mary's hospitals. East of the Falls is a New York state reservation of 107 acres, which was secured in 1885 for $1,500,000. It includes Prospect Park and Goat Island.

Electricity generated by the Falls is used for manufacture in the city and for railroad and other power purposes within a surrounding zone of 25,000 square miles. This power is especially used in Niagara Falls in electrochemical works and for the manufacture of calcium carbide, carborundum, aluminum and electrical devices. Among the chief industrial establishments of the city are a large shredded-wheat biscuit plant, and pulp, paper, flour and lumber mills. Nine thousand men are employed in these plants, whose annual output is

valued at $45,000,000. The international trade for a single year sometimes exceeds $42,000,000.

The Falls of the Niagara were discovered by Father Hennepin in 1678. In 1892 the two villages of Niagara Falls and Suspension Bridge were together chartered as the city of Niagara Falls. In 1915 the city adopted the commission form of government. Niagara Falls entertains thousands of visitors annually. See NIAGARA FALLS AND RIVER. G.W.K.



NIAGARA FALLS AND RIVER. In the Iroquois tongue the Niagara River is called with fine poetic inspiration the "thundering water." It connects Lake Erie and Lake Ontario, and discharges the outflow of all the Great Lakes except Lake Ontario. For the thirty-three miles of its course it separates New York state from the Canadian province of Ontario; it is navigable throughout the most of its length, the principal exception being the nine miles occupied by the series of rapids and the Falls that constitute its chief natural glory. The Welland Canal, built by the Canadian government, carries lake commerce to Lake Ontario.

The Falls and Whirlpool. Along the plateau which it traverses after emerging from Lake Erie, the river flows tranquilly between level banks, being swift and turbulent only for a short distance near its source. Near the lower edge of the plateau, its waters divide to pass on either side of Grand Island, and a little distance beyond the point where they reunite the channel swiftly narrows, and the river enters upon a series of rapids. Down these rapids the waters race for their leap into space, plunging a mass of 500,000 tons a minute into the gorge. Goat Island separates the river into two unequal streams just above the Falls—the greater hurling itself over the ledge on the Canadian side, forming the magnificent Horseshoe Falls, and the lesser over that on the east shore, forming the American Falls. The Horseshoe Falls have a length of 2,950 feet along the crest, or 1,230 feet across the chord of the circle. This main cataract carries over ninety per cent of the entire volume of water and has a fall of 158 feet. The American Falls are 1,060 feet along the curve and have a drop of 167 feet.

The gorge is scarcely less splendid than the Falls themselves. It stretches for a distance of seven miles, from the brink of the Horseshoe Falls to the escarpment at Lewiston. Its first reach is almost straight, and the river flows placidly between towering walls of rock for a distance of two and one-fourth miles. It then passes under the railroad bridges and enters the Whirlpool Rapids, where the waters are churned and beaten in their leap from ledge to ledge. Below the rapids, the channel swerves sharply to the left, and the violence of the current has hewn a circular basin out of the rock. In this basin the waters whirl and foam, forming the most impressive maelstrom in the world. Below the Whirlpool, the channel has

once more a gentle slope, and the waters flow quietly along the Ontario plain for the last seven miles of their course.

The Whirlpool Cableway. Next to the Falls themselves, the Whirlpool holds for the tourist more fascination than any other of the wonders of the Niagara region. Visitors may now enjoy a safe but thrilling trip across the maelstrom itself, for there was completed in 1916 an aerial cableway reaching from Colt's Point to Thompson's Point on the opposite bank, both terminals being in the Canadian province of Ontario. This cableway is patterned after one used in transporting passengers across a gorge at San Sebastian, Spain, and the enterprise was financed by Spanish capitalists. The Niagara aerial cable is the only one of its kind in North America. The passenger car, which provides seating space for twenty-four persons and standing room for twenty-one others, besides the conductor, is suspended from a running gear which travels on six parallel track cables. Each cable is entirely independent of the others, so the breaking of one cable will in no wise endanger the lives of the passengers. The car is ten feet, ten inches wide, twenty-four feet long and twenty-three feet high, and is propelled by a steel traction cable. It is also equipped with a five-horse-power gasoline engine to be used in case of emergency. Various other appliances have been installed, insuring the passengers the highest possible degree of safety. This remarkable tramway is 1,800 feet long. To construct it across the gorge its promoters had to secure permission from the

LOCATION OF AERIAL CABLEWAY

The Whirlpool is above the cableway (at left). In the illustration the river disappears in the distance towards Lake Ontario, about five miles north.

United States and New York state governments, the government of the province of Ontario and the Victoria Park Commission of Niagara Falls.

Origin of the Niagara Region. Geologists have shown that this magnificent natural spectacle had its origin after the withdrawal of the last great ice sheet, which had so modified the surface of the land that the watercourses were

BRIDGE BELOW THE FALLS

One of the great suspension bridges spanning Niagara River. The Falls are in the background.

forced to trace new channels (see GLACIAL PERIOD). The Niagara River since then has been working backwards. The age of the gorge has been the subject of much speculation among scientists, and for an excellent reason. If the time taken by the Niagara River to cut its ledge back from the escarpment at Lewiston to the present position of the cataract could be determined, geologists could speak much more confidently of the duration of geologic periods; that is, they could compare them more exactly with human chronology. As it is, the age of the gorge can only be conjectured, but scientists believe that it cannot be less than 20,000 years old. If the flow had been constant and the rock through which it cut of uniform thickness and hardness, the period of the river's labors would be easier to fix, for it is known that the cliff has been worn back 335 feet in sixty-three years. But earlier formations were not like the present material, so the rate of cutting cannot be accurately determined. At the present time the ledge at the Horseshoe Falls is being worn back about five feet each year. The cutting at the American Falls is much slower, estimates as to the rate varying between two-tenths and six-tenths of a foot a year.

The Falls are formed by an outcropping layer of hard limestone about eighty feet thick. Underneath this upper layer are softer alternating layers of limestone, shale and sandstone, the whole resting on a bed of soft shale. The top layer of limestone projects in a ledge, and below this the rock is hollowed out so that it is possible, as in the Cave of the Winds, to pass behind small segments of the falls. Spray and water are dashed constantly against the base of the cliff, and it is supposed they have worn it away.

Parks. Niagara has long continued to attract its thousands of visitors annually, and its scenic

value has been recognized by the governments of New York state and the Dominion. In 1885 New York took over control of the land adjoining the Falls on the American side and established Niagara Falls Park—a reservation containing 107 acres. The following year the Canadian government set aside 154 acres on the Canadian shore, which is known as the Queen Victoria Niagara Falls Park. An electric railway follows the brink of the gorge on the Canadian shore, giving an excellent view of Horseshoe Falls. It connects by the Queenston Bridge with an electric line skirting the river within the gorge on the American side, so that the tourist may see the gorge both from the heights and from the level of the river. There is a third line which skirts the bluff on the American side. The cantilever bridge which spans the gorge above the Whirlpool is worth noting. It was the first bridge of the kind to be built in America, and has a length of 910 feet.

Water Power. The first plant erected to utilize the enormous water power of Niagara Falls was built in 1853; since then huge power houses have been erected on both sides. The industrial development threatened for a time to ruin the Falls as a spectacle, by diverting so much water as to diminish the flow, but an agreement was entered into between Canada and the United States in 1910 providing for the restriction of the amount of water which might thenceforth be diverted for industrial purposes. The maximum amount which may be used for such purposes on the American side is 20,000 cubic feet per second, and on the Canadian side, 36,000 cubic feet.

Much of the water is converted into electrical energy by means of turbine wheels. Power is conveyed as far as Buffalo, where the street railways are run by the power created by the waters at the Falls. Since the turbines were installed, the Falls region has become the center of rapid industrial expansion. The power generated amounts now to about 300,000 horse power, and there are projects for considerably increasing this amount. The Falls furnish the power for their own illumination at night, a system of electric lighting having been installed in 1916. G.B.D.

Consult Dow's *State Reservation at Niagara;* Hulbert's *The Niagara River.*

NIBELUNGENLIED, *ne' beh loong en leet,* a German epic, dating probably from the twelfth or thirteenth century, and ranked as one of the great poems of the world. The name of the author is not known, nor whether the action is founded on historical happenings. The story is as follows: Siegfried, king of the Nibelungs, and possessor of the wonderful Nibelung treasure, marries Kriemhild, sister of King Gunther of Burgundy. Gunther wishes to wed Brunhilde of Iceland, who is to be won only by the man who can overcome her in combat, and Siegfried, donning a magic cloak, wins her for Gunther. Years later, when a dispute as to the relative dignity of the two kings arises, Kriemhild taunts Brunhilde with having been won by Siegfried instead of by Gunther, and the Icelandic princess induces Hagen, one of Gunther's vassals, to put Siegfried to death. Kriemhild later marries Etzel, king of the Huns, but she never forgets Siegfried or gives up her thoughts of vengeance, and in pursuance of her plan invites Gunther with his wife and followers to visit her at her husband's court. The Huns fall upon the visiting Burgundians and put them to death, Kriemhild slaying Gunther and Hagen with her own hand. The treasure of the Nibelungs is supposed to lie at the bottom of the Rhine, having been sunk by Hagen before he set out on what he felt would be an ill-fated visit.

For centuries after it was written the *Nibelungenlied* attracted little attention, but from the beginning of the nineteenth century it has been the object of much interest and study. As a picture of life in the Middle Ages it is of immense value. Wagner based on the story his *Ring of the Nibelungs.*

Consult Aldrich's *Guide to the Ring of the Nibelung, the Trilogy of Wagner.*

NICARAGUA, *nik a rah' gwa,* next to Guatemala, is the largest republic of Central America. It is a land of rich, undeveloped resources and favorable climate, awaiting capital, energy and new impetus. It lies between the Pacific Ocean on the west the Caribbean Sea on the east, Honduras on the north and Costa Rica on the south. Covering an area of 49,200 square miles, it is only ninety square miles smaller than Guatemala and four square miles

LOCATION MAP
Showing the place of Nicaragua among the Central American republics.

smaller than the state of New York. It is the most thinly-populated of the Central American republics, averaging only twelve people to the square mile. Its population of 600,000 in 1910 was one-third that of Guatemala and one-fifteenth that of New York. In 1920 its population was 638,119. In 1921 it joined the short-lived Republic of Central America.

Nicaragua is said to have been named after an Indian chief named Nicaras, or Nicaragua, who was at one time powerful in the country.

Climate, Land and Products. Nicaragua, like all Central America, is a tropical country, but its climate, though warm, is healthful in most parts. The eastern part of the republic is a wide, rolling plain crossed by mountains, with highlands toward the northwest. There rain falls nearly every day in the year, averaging over 200 inches annually. Between an eastern and western range of mountains lies a great fertile basin, 300 miles long and 100 miles wide. This is the most temperate zone of the country, and it is cooler and drier than the coasts; here most of the industries and population are centered. In the western part of this plain lie Lake Nicaragua, with an area of over 3,000 square miles, and Lake Managua, which empties into the former through the Tipitapa River. The Pacific slope is steep and narrow and along the coast is a chain of volcanic cones, some still active, but none reaching more than a height of about 6,000 feet above sea level.

Nicaragua has numerous rivers, the chief of which flow to the Caribbean Sea. The San Juan, which drains the two lakes mentioned above, is of importance for navigation, as is also the Rio Grande, in east-central Nicaragua. The banks of the latter are lined with banana plantations, and those crops, the most important products of the eastern part of the republic, are carried on the river to Bluefields, for shipment to America. In the eastern section, cocoanuts, plantains, oranges, pineapples and yuccas are also raised, but most of the food supply for that section is imported from the United States.

The western half of the country produces most of its own food, and coffee, sugar cane, cacao, corn and beans are articles of export. Forest products are of commercial importance; mahogany, cedar and other valuable timber, as well as dyewoods, gums and medicinal plants, are exported. One of the principal sources of wealth consists of cattle, of which there were 1,200,000 in 1914. The high plains afford excellent pasturage. Many hides are exported.

Gold mines are worked by American and British companies. Copper, silver, coal, oil and precious stones are also found, and Nicaragua exceeds all other Central American republics in mineral wealth, but mining industries show little activity, owing to exceedingly poor transportation facilities and lack of labor.

Transportation and Commerce. There are few good roads in the country, and communication between the eastern and western sections is almost impossible. Contracts have been let recently, however, for roads which will materially facilitate intercourse. The only railway in 1914 was the Pacific Railroad, 171 miles long, connecting with steamers plying on the lakes.

The capital of the republic is Managua. Leon, in the northwest, is the largest city; it is described elsewhere in these volumes. Corinto and San Juan del Sur are the principal western seaports, and through them pass about eighty-six per cent of the republic's $7,500,000 worth of exports, and about sixty-four per cent of its $5,500,000 worth of imports. The opening of the Panama Canal has facilitated commerce with this important western section. The chief eastern ports are Bluefields, Pearl Lagoon and Greytown.

People and Government. The people of the eastern half of Nicaragua are chiefly Indians and negroes, with only a few Americans and people of Spanish descent. Most of them are inactive and content to lie in their hammocks of grass, living on the fruits of tropical trees and plants, working only when absolutely necessary. In the western half of the country, although there are many Indians, most of the people are of pure Spanish descent and mixed Spanish and Indian blood. Greater industry is found among the people in that half of the republic.

There are about 356 elementary schools, ten colleges and two universities, but education is in a very backward state. Roman Catholicism is the state religion, but there is complete freedom of worship. The Indians still hold to their strange superstitions. Corrupt forms of Spanish and English are spoken.

The republic is governed by a President, elected for four years, and a Congress of two houses, elected for four years, by popular suffrage. The present constitution was adopted in 1913.

History. The history of Nicaragua is largely that of Central America. The famous plundering expedition of William Walker in 1855 is one of the most notable events of interest.

During the year 1914 it became necessary on several occasions to land American marines in Nicaragua to protect American interests. In 1916 Nicaragua and the United States entered into a treaty whereby the latter gained the perpetual right to build a canal over any desired route in the country; this was a revival of the old proposal for a Nicaragua Canal, but at present simply to hold the charter against any attempt by other nations to develop such an enterprise. In 1917 Nicaragua, as an act of sympathy towards the United States, severed diplomatic relations with Germany. See WAR OF THE NATIONS. M.S.

Consult Palmer's *Central America and Its Problems;* Walker's *Ocean to Ocean.*

Related Subjects. The following articles in these volumes will be found helpful by the reader interested in Nicaragua:

Banana	Mahogany
Bluefields	Nicaragua, Lake
Cattle	Nicaragua Canal
Central America	Panama Canal
Cocoanut	Sugar Cane
Coffee	Walker, William
Leon	

NICARAGUA, LAKE, a body of water in the republic of Nicaragua, in Central America. It is nearly equal in size to Delaware and Rhode Island combined, and has an area of over 3,000 square miles, is 110 miles long and forty-five miles wide, and is thus the largest lake between Titicaca, in Peru, and Lake Michigan, one of the North American Great Lakes. Lake Nicaragua is a part of the proposed Nicaraguan waterway connecting the Atlantic and the Pacific oceans (see NICARAGUA CANAL). The lake, which is twelve miles from the Pacific, is 106 feet above sea level, varies from fifty to 200 feet in depth, and contains a number of islands; the largest is Ometepe, on which are two active volcanoes. On the north the Tipitapa River connects Lake Nicaragua with Lake Managua, while the San Juan flows out of it on the southeast and empties into the Caribbean Sea. Ages ago Nicaragua and Managua were one body of water.

NICARAGUA CANAL, a ship canal projected across the Isthmus of Nicaragua in Central America, which had for its purpose the opening of a waterway for commerce between the two oceans bordering America. This object was finally accomplished by the completion of the Panama Canal, in August, 1914, and the Nicaragua plan was abandoned. According to the original survey of 1849, the Nicaragua Canal was to extend from Greytown, San Juan, on the Caribbean Sea, to Brito, on the Pacific Ocean, and have a length of 183.86 miles, of which a section 70.51 miles in length was to be through the San Juan River and Lake Nicaragua. A concession was granted for the construction of the canal in 1849, Cornelius Vanderbilt becoming head of the company.

THE ABANDONED ROUTE
The United States has renewed its option, and a canal may some day be built.

After the signing of the Clayton-Bulwer Treaty between the United States and Great Britain in 1850, the project was held in abeyance for nearly forty years, but work on the canal was begun in 1889 at Greytown. The constructing company, however, found the burden greater than had been anticipated, and after spending $4,000,000 sought about $100,000,000 from Congress, with arrangements for government supervision. The work ceased after this request was denied, and the concession from the Nicaraguan government lapsed. The Federal government appointed a commission to survey a route for a canal in 1897, and in 1903 the Panama route was adopted, the United States purchasing the properties of the French company at Panama for $40,000,000. See PANAMA CANAL; CLAYTON-BULWER TREATY.

That the idea of a canal across Nicaragua has not been abandoned is indicated by the ratification of a treaty between Nicaragua and the United States, in February, 1916. According to its terms the United States agreed to pay $3,000,000 for a ninety-nine years' lease of two islands in Fonseca Bay, with the privilege of maintaining a naval base on the shore of the bay. Nicaragua also conceded to the United States the perpetual right to build (without taxation or other charges) a canal over any desired route in Nicaragua. Even though a canal is never constructed, the treaty will prevent any attempt to build such a waterway on the part of any foreign power.

NICE, *nees,* in Italian, NIZZA, a city of France, of world-wide fame as a winter resort. It occupies a magnificent site on the Mediterranean Sea, at the base of the Alps Mountains, 140 miles east-northeast of Marseilles and 640 miles southeast of Paris. Nice lies at the western end of the stretch of seacoast known as the Riviera. The picturesque Alps form a barrier to cold winds from the north, and the mild but bracing climate of the region attracts thousands of winter visitors every year. Between January and June the fine hotels in the newer section of Nice are crowded with people in quest of health or pleasure, and the city takes on an aspect of gayety. The old town, a small section with narrow, winding streets, lies on the left bank of the small Paillon River; on the opposite side of the stream is the spacious new part, where the foreigners sojourn.

Here the avenues are wide and beautified with plane and eucalyptus trees. The Casino, with its numerous recreation facilities, is a notable structure, and of equal interest is the Public Garden, which extends from the Casino to the sea. Stretching westward for over two miles along the bay is a magnificent promenade lined with handsome hotels and villas. In the city, too, are the churches, schools, museums, libraries and theaters of a modern municipality. Nice has a large export trade in oranges, lemons, flowers, perfumes, olives, oils and liquors, and is a manufacturing center for ivory goods, furniture, silks and dyes.

The city, known to the ancients as Nicaea, was founded in the fourth century B. C. It is now the capital of the department of Alpes-Maritimes. Population (city and suburbs) in 1921, about 145,000.

Consult Loveland's *Romance of Nice.*

NICE, *nees,* or **NICAEA,** *ni se'a,* COUNCILS OF, two councils of the Christian Church held at Nice, in Bithynia, Asia Minor, in 325 and 786. The first was convened by the Emperor Constantine, chiefly to discuss the Arian views of the Trinity, and to settle the disputes these had created. The outcome of the controversy was the adoption of the NICENE CREED (see below). Another question determined was in reference to the time for observing Easter. It was questioned whether the Christian observance should be on the same day as the Jewish, the fourteenth of the month Nisan, or on the following Sunday (see EASTER).

The second council was called by the Empress Irene and Constantine, her son, as a result of the violent opposition to the decree of the Emperor Leo, the deceased husband and father, that the use of images be forbidden for any purpose. The empress revoked this decree (see ICONOCLASTS).

Nicene Creed, a summary of the chief articles of the Christian faith, adopted by the first Council of Nice in 325. It was originally as follows:

> "We believe in one God, the Father Almighty, maker of all things, both visible and invisible; and in one Lord, Jesus Christ, the Son of God, begotten of the Father, only begotten, that is to say of the substance of the Father, God of God and Light of Light, very God of very God, begotten, not made, being of one substance with the Father, by whom all things were made, both things in heaven and things on earth; who, for us men and for our salvation, came down and was made flesh, made man, suffered and rose again on the third day, went up into the heavens, and is to come again to judge both the quick and the dead; and in the Holy Ghost."

The Nicene Creed has been changed since its adoption, but by what authority it is unknown. It is next oldest to the Apostles' Creed.

NICHOLAS I, *nik'o las,* NICHOLAS PAVLOVITCH (1796-1855), an emperor of Russia, the third son of Paul I, and called "The Iron Czar." Excellent tutors were provided for him, and he traveled widely, but he had neither desire nor taste for education, much preferring military life, especially its spectacular side, which afforded him an opportunity for display. When his brother, Alexander I, died in 1825 Nicholas came to the throne, his elder brother, Constantine, having resigned his claims. He was at once confronted with a rising among the soldiery, which was put down with great severity. Nicholas felt that there was something wrong with the government of the country, but he declared that what it needed was not liberal reform but stricter discipline and supervision. He made more severe the censorship of the press and introduced a system of secret policing which kept him in close touch with the affairs of his empire but made him and his government very unpopular. Many of the most objectionable features of Russian government which led to the revolution of 1917 and the deposition of Nicholas II were instituted by this ruler.

Failed in Crimean War. The foreign policy of Nicholas was aggressive. A war with Persia shortly after his accession added Persian Armenia to Russia, and a war with Turkey (1828-1829) won for Russia the eastern shore of the Black Sea and a protectorate over Moldavia and Wallachia. Nicholas had the characteristic Russian attitude toward Turkey, hoping that

he might be able to drive it from Europe; and as a pretext for war he demanded a protectorate over the Christian subjects of Turkey. The result was the Crimean War, in which England and France joined Turkey in resistance to the ambitions of Russia, and before the close of that struggle Nicholas died, overwhelmed by grief at his failure.

The "iron czar" was a commanding figure in the history of his time. Sincere, and meaning to be just, he was misled by his vanity as well as by his love for his country into courses which humiliated rather than strengthened Russia. See ROMANOFF.

NICHOLAS II (1868-1918), czar of Russia from 1894 until 1917, was the eldest son of Alexander III, and a member of the imperial family of the Romanoffs (see ALEXANDER; ROMANOFF). No ruler ever ascended a throne with a greater

THE MURDERED CZAR AND THE CZARINA

Until March, 1917, he was czar of all Russia, and "Little Father" to the millions of peasants in his empire. Nicholas was a Romanoff; his wife, a German princess. Her sympathy for the German cause in the War of the Nations and the strength she showed in diplomacy hastened the downfall of the dynasty. She was the second woman to possess commanding influence in connection with the war, the other being the queen of Greece, a sister of the German emperor. Her husband also lost his throne, and her eldest son, the crown prince, was set aside. The second son, Alexander, succeeded to the crown.

opportunity than his—the opportunity to lift his country, downtrodden by centuries of despotism, to a position among the free, progressive nations of the world, and to give the great mass of Russian peasants the sacred right to live in comfort and happiness. His unwillingness or inability to measure up to this opportunity brought his downfall; students of Russian government attribute his failure more to inability to cope with the powerful influences surrounding him. In 1917 the Russian people revolted, forced him to abdicate his throne and organized a republic. He and his family were imprisoned in Siberia, and in 1918, probably on June 16, he was shot to death by members of the bolshevist regime.

Nicholas II was born at Petrograd. He received a military education, and traveled through Greece, Egypt, India and Japan before his ascension to the throne of his father. The same year of his ascension (1894) he married the German Princess Alexandra of Hesse, who bore him four daughters and a son. Russian liberals had hoped that the new czar would grant extensive and badly-needed reforms, for he was known to be of a mild and amiable disposition, but in this hope they were disappointed. Nicholas II, though he attempted to make more humane the enforcement of government regulations, showed that he believed in autocracy. A time came, however, when the demands for constitutional reform became too insistent to be ignored, and in 1905 the czar issued a decree establishing freedom of the press and a legislative body (see DUMA). Even with these concessions, little real progress toward liberal government was made.

In his foreign policy Nicholas declared himself an advocate of peace. He exchanged visits with the rulers of Austria, Germany and France, and it was he who initiated the famous Peace Conference at The Hague (see PEACE CONFERENCE, INTERNATIONAL). He was not able to keep his country out of war, however, and the struggle with Japan in 1905-1906 ended disastrously for Russia (see RUSSO-JAPANESE WAR). During the next few years the conflicting interests of the powers pointed the way toward a general European war, and Europe became an armed camp. When, in July, 1914, Austria declared war on Serbia, Russia, as the friend of the small Slav nations, came to the support of Serbia, and in a short time was involved in the most terrible conflict of modern times (see WAR OF THE NATIONS). In this war the inefficiency of the government of Nicholas brought Russia to such a demoralized condition that a revolution inevitably followed. (The details of this upheaval will be found in the article RUSSIA, subtitle *History*). The czar, his wife, son, four daughters, and several retainers were murdered in Siberia.

Consult Vasili's *Behind the Veil of the Russian Court;* Harden's *Monarchs and Men.* No book in print in 1917 deals with the effects of the revolution of that year upon the former czar.

NICHOLAS, SAINT (? - about 326), a saint reverenced everywhere as SANTA CLAUS by the children, who look upon him as the free-handed bestower of gifts at Christmas time. This rôle is merely an acquired one, however, the real Saint Nicholas standing for other things. According to tradition, upon which all accounts of this saint, popular alike in the Roman Catholic

and the Russian Church, depend, he was born at Patara, in Lycia, and became bishop of Myra. He is supposed to have worked many miracles, some of them miracles of healing, some wonders to convert unbelievers; and for a time he suffered imprisonment for his faith.

December 6, the day of his death, was long celebrated with special observances in most countries of Europe, and became one of the most popular of saints' days. Especially was Saint Nicholas the patron of travelers by land and by sea, of scholars, and of the young, and because of this latter connection, as well as because of the fact that his feast day fell close to Christmas, he was given a new rôle, that for which he is most famous, at least in non-Catholic countries. The Dutch, shortening his name affectionately, made of him "Santa Claus," and thus he is most commonly known. Probably the best-known children's poem ever written is *A Visit from Saint Nicholas,* by Clement C. Moore (1779-1863), which describes the coming of "Good Saint Nick," and is identified at once by its opening lines:

'Twas the night before Christmas, when all through the house,
Not a creature was stirring,—not even a mouse;
The stockings were hung by the chimney with care,
In the hope that Saint Nicholas soon would be there.

NICHOLAS NICKLEBY, *nik''l bi,* a novel by Charles Dickens, published in 1838-1839. The plot concerns itself with the struggle between Nicholas and his cruel and evil-minded uncle, Ralph Nickleby, and with the rise of the hero from poverty to fortune. It is not the plot, however, which arouses most of the interest, but the characters, some of them grotesque, many of them humorous. The Mantalinis, Mrs. Nickleby, the Squeers family, the Kenwigses, are all in their way inimitable, and would be of absorbing interest even if no thread of plot connected them. Dickens' picture of Dotheboys Hall, the Squeers's school in Yorkshire, was recognized as a true description of more than one such institution, and aroused such indignation that many of the abuses attacked were remedied. Nicholas's experiences with the theatrical Crummles family form one of the most interesting parts of the book.

NICHOLSON, *nik''l son,* MEREDITH (1866-), an American novelist whose stories have pleased a wide circle of readers. He was born at Crawfordsville, Ind., was educated in the public schools of Indianapolis, and began newspaper work when eighteen years of age. For fifteen years he was actively identified with newspapers of Indianapolis, but it was as a writer of entertaining fiction that he won a national reputation. *The House of a Thousand Candles, The Little Brown Jug at Kildare, The Lords of High Decision, The Main Chance, Otherwise Phyllis, The Proof of the Pudding, The Port of Missing Men, Rosalind at Red Gate, Black Sheep! Black Sheep!* and *The Man in the Street,* are some of his novels. The poems in his *Short Flights* and his volume of essays *The Provincial American* show his ability in other fields. In 1914 he published a story entitled *The Poet,* the central character of which is the late Hoosier poet, James Whitcomb Riley.

NICIAS, *nish'i as* (? -413 B. C.), an Athenian general and statesman, prominent during the Peloponnesian War. He was wealthy and of the aristocratic party, and opposed in succession Pericles and Cleon. His dominating characteristic was caution, which he carried to such extremes as to make his name a byword. In the war against the Spartans he won several victories, capturing Minoa and Cythera, and in 421 B. C. concluded with Sparta the so-called Peace of Nicias, which marked the close of the first phase of the war.

The war policy of Alcibiades led in 415 B. C. to the expedition against Sicily, and although Nicias was strongly opposed to the project, he was made one of the leaders. Alcibiades was soon summoned home, and Nicias as chief commander proved himself unequal to so great a task. The siege of Syracuse ended in disaster to the besieging party, and upon his surrender Nicias was put to death. No less a man than Thucydides was one of his strong admirers, but in his eulogies commends him rather for his conventional piety than for any statesmanlike qualities.

NICKEL, *nick''l,* a white metal with a slight yellowish tint, about nine times heavier than water, and very hard. Pure nickel is brittle, but when it contains a little magnesium or phosphorus it can be rolled into very thin sheets (see ALLOY). It takes a high polish and does not tarnish readily when exposed to the air. Nickel is extensively used in electroplating and in the manufacture of metallic articles which need to be less expensive than those made of silver; any article of metal which has been carefully nickel-plated has all of the appearance of burnished silver. The five-cent piece of United States coinage is of nickel. The mines at Sudbury, Ontario, are the chief

source of supply for the world. Nickel forms a number of alloys, the most important being German silver (which see).

NICOBAR, *nik'o bahr,* **ISLANDS,** a British group of nineteen islands in the Bay of Bengal, between the Andaman Islands and Sumatra. The total area of the islands, of which only twelve are inhabited, is about 635 square miles, Great Nicobar, the largest, having about 333 square miles. The climate is very unhealthful for Europeans.

Most of the natives, who are of a low order of civilization, are supported by the trade in cocoanuts and copra. Piracy and wrecking formed their chief occupation prior to the British occupation in 1869, but since then they have been peaceful. The Danes unsuccessfully tried to colonize the Nicobars, but failed and abandoned them in 1848. The Nicobar Islands are under the government of India, administered from the Andaman Islands.

NICOLET, *ne ko leh',* the county town of Nicolet County, Quebec. It is at the mouth of the Nicolet River, which empties into the Saint Lawrence River at the eastern end of the expansion known as Lake Saint Peter. Nicolet is on the Intercolonial Railway and the Quebec, Montreal & Southern railways, eighty-two miles northeast of Montreal. By the shortest rail route it is ninety-four miles southwest of Quebec. Nicolet is the seat of a Roman Catholic bishop, and has a cathedral, college, normal school and two monasteries. The college has about 300 students. The town's principal industrial establishments are sash-and-door factories and a tannery. Population in 1911, 2,593; in 1921, 2,342.

NICOTINE, *nik'o tin,* or *nik'o teen,* a colorless, oily, transparent vegetable alkaloid, with a hot and bitter taste, found in small quantities in the leaves, roots and seeds of the tobacco plant, of which it is the most active principle. The quantity of nicotine in nearly all tobacco ranges from two per cent to seven per cent of its composition. It is practically absent from Turkish tobacco; in the Western hemisphere it is found least in good Havana tobacco and is most abundant in cheaper and "domestic" varieties. The analysis below shows the percentage of the drug in the leaves of the most important grades, although the amount varies somewhat in different plants in the same locality:

Havana	.02	Pennsylvania	.034
Florida	.024	Connecticut	.035
Maryland	.03	Wisconsin	.038
Tennessee	.052	Kentucky	.061
Mexican	.056	Virginia	.068

Nicotine is exceedingly poisonous, and in a pure state even a very small quantity will cause vomiting, great weakness, rapid but weak pulse, and possibly collapse. Death has been known to follow within a few minutes after a little of the pure drug has been taken. In smoking, a good portion of the nicotine present in the tobacco passes off in smoke; otherwise smoking would be fatal to those who indulge the habit to excess; what remains after burning may prove a discomfort to the smoker, but is not considered dangerous. It is the nicotine which makes the young man so deathly sick when he smokes his first pipe or cigar, for his system is a stranger to the active drug. A condition of tolerance follows repeated efforts, and eventually the ill-effects largely disappear. Of the effects of nicotine upon a smoker an English physician, Dr. Richardson, says:

> It is innocent as compared with alcohol; it does infinitely less harm than opium; it is in no sense worse than tea, and by the side of high living it contrasts most favorably.

Even regarding this comparison as scientifically accurate, the fact of the virulence of the poison is not obscured. The knowledge that only about one per cent remains in tobacco in the process of smoking to affect the user is all that renders the medical world in the least degree tolerant of the practice.

NIELLO, *ni el'o,* a method of ornamenting silver and gold plates, by filling up the lines of the design cut into the metal with a black composition to make the design stand out more clearly. The surface of the engraving is then smoothed down and burnished. Traces of this art are found in ancient Roman work, and it was popular under the Byzantine Empire from the sixteenth century on, when altar plates and similar decorative objects belonging to the Christian ritual were ornamented by this process. In modern work the black pattern stands out in relief; the art is still practiced successfully by the goldsmiths of Russia and metal workers of India.

NIELSEN, *neel'sen,* Alice (1876-), an American operatic soprano, who gave up her career as a prima donna in light opera to devote years of study to qualify herself as a grand opera singer. She was born at Nashville, Tenn., and made her first public appearance in her early teens, singing the part of Yum Yum in the *Mikado* at the old Tivoli Opera House, in San Francisco. Then she became the leading

soprano of the famous Bostonians, and later toured the country at the head of her own company. Believing that she could make no further progress in this field, she forsook light opera in the height of a successful career, and began life over again as a student. But those years of struggle for supremacy yielded a rich reward. Soon after her operatic debut in Italy, in which she took the part of Marguerite in *Faust,* engagements followed at all the important opera houses of Europe; in 1904 she appeared with Melba, Destinn, Caruso and others in *Don Giovanni.* She has distinguished herself particularly as a singer in Mozart's operas, and has appeared with great success in many rôles as a member of the San Carlo, the Boston and the Metropolitan opera companies.

NIETZSCHE, *ne'cheh,* FRIEDRICH WILHELM (1844-1900), a German philosopher, born near Leipzig. His education was received principally at the universities of Bonn and Leipzig, and in 1869 he was made professor of classical philology in the University of Basel. Some years later severe eye and brain trouble forced him to retire on a pension; and he spent his time going from one health resort to another until 1888, when he was declared incurably insane. His friendship with Wagner ended unhappily with his declaration of Wagner's music as decadent; losing his faith in Wagner, it was said he also lost his faith in God. In later years he scorned his teacher, Schopenhauer, although he did not succeed in producing anything in advance of his master's philosophy.

Owing to Nietzsche's intense emotional and nervous temperament, his writings rise to heights of brilliance, but his philosophy cannot be termed systematic or consistent. He denounced the Christian faith, refused longer to accept what are generally termed the Christian virtues, and made of the Superman (Uebermensch) his ideal, who should trample underfoot the lowly and weak-spirited and on them rise to higher things. He revolted against modern ideas of democracy and became an aristocrat; but also he assailed state supremacy and became an anarchist. The "will to power" was his guiding principle; the moral man must live only for self. His writings strengthened the fighting spirit of German autocracy.

So contrary to all accepted principles of ethics was all Nietzsche's thinking, so much a revolt against all conventions, that he will doubtless be read chiefly for the brilliance of his epigrams and for the fascination of his style. His principal works include *The Birth of Tragedy; Thus Spake Zarathustra; The Twilight of the Idols; Human, All-Too-Human; The Case of Wagner; Nietzsche contra Wagner; The Will to Power; The Antichrist* and his *Poems.*

NIFLHEIM, *neev''l hame,* in Norse mythology, a region of everlasting cold and darkness, the abode of Hel, the goddess of death. In one of the Eddas it is told that a messenger, journeying thither to inquire of Hel if Balder, son of Odin, could be ransomed, wandered nine days through dark and terrible chasms. Niflheim was located under one of the roots of Yggdrasil, the mystic ash tree. Not only the wicked were cast into this cheerless place, but all those who died of sickness or old age. Consequently many took their own lives in order to save themselves from the fate decreed those who died ingloriously.

NIGER, *ni'jer,* or **JOLIBA,** *jol'i ba,* the third largest river of Africa, ranking next to the Congo and the Nile, and the only one on that continent affording to light-draught steamers a watercourse, free from rapids, communicating with regions far in the interior. This it does by means of its chief tributary, the Benue, which joins the larger stream 250 miles from the mouth, and has itself a navigable stretch of 600 miles. Railroads connect the Niger with the Senegal and with the Guinea coast. This great river rises in West Africa only 150 miles from the Atlantic coast, but so devious is its course that it flows for about 2,600 miles before reaching its outlet on the Gulf of Guinea. It empties into the gulf through a great delta, after describing an immense curve whose directions are northeast, east and southeast. Its total drainage basin, covering an area of 584,000 square miles, is almost as large as Alaska. The territory traversed by the Benue and the permanently navigable portion of the main stream is under British control, while the upper courses flow through French possessions.

Rabba, 460 miles from the mouth, is the head of steam navigation for the year round, and below this town the Niger is a broad, quiet river which is fifty feet deep in dry seasons and over twice as deep at flood time. Its delta, which extends about 150 miles inland, is the largest in Africa and covers an area of 14,000 square miles. It is a vast swampy region, in which the river breaks up into innumerable channels that divide and subdivide and cross and intercross in seemingly hopeless confusion. Of the numerous arms of the delta the Nun is the only one used by seagoing vessels. The Niger was known to geographers of the Middle

Ages, but was not viewed by Europeans until 1790, when its upper course was explored by Mungo Park.

NIGERIA, *ni je'ri a,* a British colony and protectorate in West Africa, the boundaries of which are formed by Dahomey, the French Military Territories of the Sudan, Lake Chad, Kamerun and the Gulf of Guinea (see colored political map of Africa opposite page 81). Nigeria, formed by the consolidation in 1914 of the protectorates of Northern and Southern Nigeria, is a region covering about 336,000 square miles—an area slightly less than that of British Columbia. In the colony there are about 17,000,000 people. The country along the gulf coast is a great, swampy delta (see NIGER); north of this section there is a region of dense forests, and north of the forest area a plateau region that merges in the extreme north with the desert lands of the Sudan. The native tribes of the delta and the forests are pure negroes, worshipers of the fetish (which see). In Northern Nigeria the people represent a mixture of races from the northern part of the continent, and among them Mohammedanism has gained a strong foothold. The Hausas, the most advanced people of Nigeria, live in the northern section. Under British control cannibalism, human sacrifices, slavery and other evil practices of the coast tribes have been eliminated.

Southern Nigeria produces rubber, mahogany, palm kernels and oil, also groundnuts, cotton, cacao, corn, cassava and other tropical plants, and from Northern Nigeria are obtained drugs, ivory, sheepskins, goatskins and tin. At the beginning of the War of the Nations there was a thriving import and export trade. Seagoing ships can dock in the harbor of Lagos, the principal port and seat of government. Inland transportation is carried on by way of the Niger and other streams, and by means of several carriage roads and 1,130 miles of railroad (1922). The colony also has telephone, telegraph and postal service. Politically, it is divided into the Northern Provinces and the Southern Provinces, each under a lieutenant-governor appointed by the British Crown. A governor-general exercises central authority.

Consult Morel's *Nigeria, Its People and Its Problems;* Raphael's *Through Unknown Nigeria.*

NIGHT'HAWK, a bird of the goatsucker family, closely resembling the whip-poor-will, but distinguished from it by conspicuous white marks on its wings, a nasal note and a habit of frequenting the open country, while the whip-poor-will keeps to the woods. It is about ten inches long, and measures twenty-three inches across, when both wings are expanded. It has soft, mottled black, white and buff plumage and a noiseless flight, and feeds high in the air,

THE NIGHTHAWK

capturing night moths, mosquitoes and other insects in great numbers, thus proving itself of much value to the farmer. The belief that the birds of this family suck goats is a mere superstition.

The summer range of the nighthawk is Eastern North America, from the Gulf states to Labrador, and it winters in South America. Its eggs, always two in number, are deposited upon the bare ground. They are of a dull white color, marked with irregularly-shaped grayish-brown blotches. This bird is active only at night. See WHIP-POOR-WILL.

NIGHT HERON, a medium-sized heron which remains quiet throughout the day, beginning its activities at sunset. There are several species, found in most parts of the world except the far northern regions. The American *black-crowned night heron,* commonly called the *quawk,* from its cry, nests in colonies from Manitoba and New Brunswick southward through South America. Its nest is built of sticks, sometimes in the tops of trees, and sometimes in bushes or on the ground. The eggs, four to six in number, are of a dull blue color. This bird is about two feet long. Its characteristic markings are the black head and back, grayish tail and wings and white throat, breast and forehead; in the spring three long white feathers hang down from its crown. The night herons feed on fishes, frogs and other water animals. See HERON.

NIGHTINGALE, a small bird of the thrush family, plain in appearance and shy in habits, but having a song of the sweetest quality, often heard at night. It has been lauded by poets of all centuries for its exquisite voice, and the finest tribute that could have been paid to Jenny Lind, the greatest singer of two genera-

tions past, was given her when she was called the "Swedish Nightingale." The cardinal bird (which see) of America is often called the *Virginia nightingale*.

The nightingale is a bird of Western and Central Europe. It is about six inches long, has upper parts of a russet-brown color, changing to reddish on the rump and tail, and the under parts whitish. It is most at home in secluded woodlands and hedges, especially along streams. It lives entirely upon insects, which it obtains from the ground, and it has the same habit of hopping rapidly at intervals and then standing motionless, as if listening, that is observed in the robin.

The sunrise wakes the lark to sing;
The moonrise wakes the nightingale.
Come, darkness, moonrise, everything
That is so silent, sweet and pale:
Come, so ye wake the nightingale.
—ROSSETTI: *Bird Rapture.*

The nightingale rears but one brood in a season, building its nest near the ground in hedges or thickets. The eggs, from four to six in number, are a deep olive-brown, unspotted. The bird is migratory, spending its winters in Africa and southern Europe. The sweet notes of this songster have a plaintive quality that, combined with its fondness for the night, gives it the name of "melancholy." Milton thus addresses the nightingale in *Il Penseroso:*

Sweet bird that shunn'st the noise of folly,
Most musical, most melancholy!
Thee, chauntress, oft, the woods among,
I woo, to hear thy even-song.

NIGHTINGALE, FLORENCE (1820-1910), an English philanthropist, born at Florence, Italy, who became the most famous nurse in the world. Her childhood was spent chiefly in Derbyshire, England, where she was privately educated. She very early showed her characteristic delight in helping the unfortunate; the dearest pleasure of her childhood was that of nursing sick animals and bandaging broken dolls. Long before reaching womanhood she would travel many miles to help an infirm or ailing person, and she was known throughout Derbyshire for her skill in the sick-room. Her social position was such that she could have spent her time in the highest society of England, but she disliked such activities. She at length refused to consider marriage or any work other than that of nursing, and in order to be prepared in every detail went to hospital schools in Kaiserswerth, Germany, and in Paris.

FLORENCE NIGHTINGALE

In 1854 tales of the suffering of British soldiers in the Crimean War began to reach England, and although the newspapers were compelled to suppress the greater part of such news enough reached Miss Nightingale to convince her that she was needed among those sufferers. She wrote to the British War Secretary, offering her services as a nurse, and on October 24, 1854, left London with a staff of thirty-seven trained assistants and a shipload of hospital supplies. She reached Scutari just in time to be of service to the great number of wounded from the Battle of Balaklava. Probably such confusion and suffering had never before been seen in a hospital. Most of the surgeons were dead or dying; there were no medicines, beds or cots; there were not even clean bandages for the wounded. She found on her arrival that the death rate was forty-two per cent, but her executive ability, resources and enthusiasm were so great that she ultimately restored order and reduced the rate to two per cent.

She was soon given entire charge of the hospital service for the British troops in the field and worked so unceasingly that in the summer of 1856 she was prostrated and never regained her health. A British man-of-war was sent to bring her home, and preparations for a great reception were made in London; but upon hearing of the plans she slipped into England on a French vessel. The grateful English, however, raised a fund of $150,000 for her; but in spite

of her real need of money, she used it to found the Nightingale Home for Nurses at Saint Thomas Hospital in London. Though confined much of the time to her room, she continued to supervise hospital undertakings in Great Britain and other European countries, was consulted officially during the War of Secession in the United States, the Franco-German War and the Spanish-American War, and wrote numerous articles and books upon the subject she had so thoroughly mastered.

Probably no other woman in the history of the world equaled her in the alleviation of suffering and distress. Innumerable tributes to her were written, but doubtless the most beautiful was that of Longfellow in his poem, *Santa Filomena.* E.D.F.

Consult Matheson's *Florence Nightingale, a Biography;* Nutting and Dock's *History of Nursing.*

NIGHT'MARE. Almost everyone knows by experience the distressing sensations of nightmare—the feeling of oppression, inability to move or speak, overwhelming fear, etc. Little children who waken at night screaming and trembling are suffering from a form of nightmare, though in these cases the disorder is generally called *night-terrors.*

Nightmare is usually caused by digestive disturbance, but may arise from disorders of the circulation or the breathing process. Prolonged mental stress or overwork may cause it in people who are naturally nervous. When nightmare comes from eating heavily before retiring, the victim has the remedy in his own hands. Parents should not permit their children to listen to tales of horror or ghost stories before bedtime, especially if the children are of nervous temperament.

The word *nightmare* has an interesting derivation. *Mare* was originally applied to an evil spirit that oppressed people at night while they were asleep, and the Anglo-Saxon root from which it is derived means *crusher.*

NIGHT SCHOOLS. See SCHOOL, under subhead *Evening Schools.*

NIGHT'SHADE, the name given to a large number of ill-smelling herbs, whose leaves resemble those of the violet in shape, and some of which have a soothing effect upon the nerves. There are about 1,500 species of these plants, and they are found growing in damp woods and fields and along shady banks, chiefly in Southern and Central America, never in very cold regions. They have, in general, slender stems, clustered small white flowers and bluish berries, many of them being poisonous. One of the latter sort, the *deadly nightshade,* sometimes called *belladonna,* was supposed to have sprung from the foam which dripped from the savage jaws of Cerberus, Pluto's three-headed dog (see CERBERUS). Other well-known species of nightshade are *woody, black* and *enchanter's.*

WOODY NIGHTSHADE

NIHILISTS AND NIHILISM, *ni' hi lists, ni' hi liz'm.* Nihilism is the name given by the Russian writer Turgenieff (about 1860), to the doctrines taught by the social agitators of his day, who wished to overthrow society as it then existed and reorganize it in accordance with their theories. These social agitators were called Nihilists.

At first, nihilism was a philosophical and literary movement. Its adherents deemed it necessary to free themselves from every form of dependence on generally accepted beliefs. In religion, this movement was frankly atheistic (see ATHEISM); in science, it supported evolution and the newer teachings of the day; in social affairs, it taught the complete equality of the sexes; in government, it insisted on the necessity of thoroughgoing changes in every department. It was inevitable that people imbued with such ideas should eagerly accept the doctrines of socialism, then meeting with great favor in Western Europe; accordingly, nihilism speedily entered on its second or socialistic stage.

When one considers the condition of affairs in Russia, it is not surprising that the movement passed under the control of the revolutionary or radical wing of socialism. Numerous societies were formed to spread these teachings among the workmen and the peasant classes. The members were fanatical in the earnestness which they displayed in this cause. Young people of both sexes, members of wealthy and aristocratic families, gave up all to spread their

doctrines among the poor and ignorant; their coworkers were from the ranks of the professional classes.

About the year 1874 the government of Russia began a determined effort to crush the movement. Literally thousands of people were arrested. Prison life was made so unbearable that scores of those in prison committed suicide before their cases came to trial. Sometimes sentences of ten, twelve or fifteen years' imprisonment at hard labor were imposed as the penalty for making one or two speeches in private to a few workmen, or even for lending a book teaching their doctrines. Thousands of people were arrested and exiled with no trial whatever, even their friends being ignorant of the fate that had befallen them.

Of late years the world has heard less of nihilism, a result due to the action of Nicholas II in authorizing the election of a Duma, thus inaugurating constitutional government; the overthrow of absolutism in Russia in 1917 went far towards destroying nihilism.

Consult Milyoukov's *Russia and Its Crisis*; Kropotkin's *Memoirs of a Revolutionist.*

NIJNI NOVGOROD, *nyeez' ne nawv' go roht.* See Nizhni Novgorod.

NIKE APTEROS, *ni' ke ap' te rahs,* Temple of, the smallest building on the Acropolis, the old fortified hill of Athens (see Acropolis). It

TEMPLE OF NIKE APTEROS

What remains to-day of the ancient Temple of Nike Apteros, or Wingless Victory. It was of small proportions—almost too small to be given the name of temple—was built in the Ionic style, and its story was told by means of sculptures.

has but a single room, in which stood a statue of Athene, or Minerva, and here she was worshiped. Athene was the patron goddess of Athens, and was always represented without wings. Nike, which means *victory,* was represented as having wings, so this little temple, dedicated to the Athene of victory, is called the temple of the victory-without-wings, or *Nike Apteros.* It stood almost as it had been built in the time of Pericles until about 1687, when it was torn down by the Turks and the stones were used in the building of fortifications. But in 1835 it was restored, and except for the missing roof, parts of the frieze, the cornice and gables, it stands as it was when first erected, close by the entrance of the Acropolis. See Minerva.

NILE, Egypt's famous river, whose annual floods make a fertile land in a rainless region. Writing twenty-three centuries ago, Herodotus called Egypt "the gift of the river" and declared that the Egyptians—

> Obtain the fruits of the field with less trouble than any other people in the world, since they have no need to break up the ground with the plough, nor to use the hoe, nor to do any of the work which the rest of mankind find necessary if they are to get a crop; but the husbandman waits till the river has of its own accord spread itself over the fields and withdrawn again to its bed, and then sows his plot of ground, after which he has only to await the harvest.

Just how rich this harvest is may be gathered from the fact that Egypt produces nearly a bale of cotton on each of the two million acres devoted to that crop, while in the United States about two and a half acres are needed for each bale.

For many centuries people knew nothing of the source of the Nile except that it was far to the south. The ancient Egyptians and Nero's Romans were stopped in their passage up the river by masses of floating vegetation called *sudd,* and though Ptolemy's theory of the origin of the stream was astonishingly accurate only the explorations which occurred between 1862 and 1884 revealed the actual truth. If one can imagine a river rising in Ecuador, and flowing as far north as Savannah, Ga., he can get some idea of the Nile's course. It is the only river in the world which rises at the equator and flows into a temperate zone. Starting at the lake called Victoria Nyanza, it winds northward nearly 4,000 miles, and so is second in length only to the Mississippi-Missouri among all the rivers of the world.

It is joined by numerous streams from the northeast of the Congo, after which it is called the White Nile, until at Khartum it is joined by the Blue Nile from Abyssinia. Through the desert its basin becomes narrower, and near Cairo it is less than 100 yards wide. For

the last 1,600 miles it has no tributaries; in places the desert comes close to its banks, in others there are high cliffs. At Cairo the delta begins.

The region benefited by the flood is below Assuan, where the great dam has been built (see ASSUAN, subhead *The Dam*). At Assuan the water rises about twenty-six feet, at Cairo about twenty-three feet. The men who lived in the time of Herodotus were puzzled because

ON THE NILE
Native boats and village of the present day.

the flood began in June and reached its height in late September, instead of coming in the spring. The reason is that the flood waters come from Abyssinia, where the heavy rains occur in summer.

Except for the six rapids called cataracts, which are between Khartum and Assuan, the Nile is navigable as far as Gondokoro in Uganda. However, before the British accomplished the difficult task of removing the sudd, the limit was near Fashoda, about half way between Gondokoro and Khartum. See colored map, facing page 81. C.H.H.

Consult Todd's *Banks of the Nile;* Dunning's *To-day on the Nile.*

NILSSON, *nil'sun,* CHRISTINE (1843-1922), a great singer of a past generation, who was born at Wedersloff, near Wexio, Sweden. Her father was a poor laborer and the first fourteen years of her life were filled with hardship. But she learned to play the violin and flute and sang so beautifully that she occasionally earned a little money by singing at fairs and other country gatherings. In 1857 a wealthy Swede named Tornerhjelm heard her at a fair and offered to pay for her musical training at Stockholm. The offer was accepted, and three years later she began her stage career in that city. After further study in Paris she appeared in 1864 in Paris as Violetta in *Traviata,* and won such applause that she was immediately engaged for three years.

In 1867 she won triumphs in London, and in 1868 in Paris sang the part of Ophelia in Ambroise Thomas' *Hamlet.* This was considered one of the greatest examples of operatic singing of the day, and a deluge of invitations to appear in various countries came to the young singer. She made a tour of the United States in 1870 and one of Russia in 1872, but during the latter year married a Paris merchant, Auguste Rouzaud, and practically retired from the stage for some years. His death in 1882 determined her to reënter upon her career, but five years later her marriage to Count de Miranda again caused her to give up the stage. Her voice was not powerful, but remarkably true, and notable for its sweet and sympathetic tone.

NIM'BUS, or, in painting, a HALO, first used in Christian art in the fifth century. About the heads of very ancient statues representing gods there were often circles of stars. The Roman emperors sometimes wore such orna-

THE NIMBUS
From early work of Raphael.

ments, intended to indicate their equality with the gods. Christians did not use halos in their earliest art, because the old association was not in keeping with their religion. Later, bands of brass were put around the heads of statuary placed out-of-doors, to prevent the wearing effects of rain and snow. From this custom came the use by artists of a circle of light painted above the heads of sacred or divine persons. It is not always circular in shape, for in many representations of the Father it is triangular, which suggests the Trinity; in representations of Christ, a cross is sometimes added to the circle; that of Mary is made of stars, and that of angels and saints is made of a circle of small rays. A square nimbus indicates that the person was living at the time of the completion of the painting.

NÎMES, *neem,* a city in the southern part of France, important industrially for its manufactures of wines and brandy, silks, cotton goods and carpets, and of historic interest because of its well-preserved Roman antiquities. Among several notable monuments of the period of Roman glory are a magnificent amphitheater, two temples, and a great aqueduct known as the *Pont du Gard.* (For an illustration of the latter see the article AQUEDUCT.) Nîmes is the capital of the department of Gard. It lies to the north and west of an extensive plain covered with vineyards, and at the base of a range of hills belonging to the Cévennes system. Lyons is 174 miles northeast by rail. The city's modern public buildings of imposing architecture, and its wide, handsome streets are in striking contrast to the remains of Roman occupation. Among its institutions are a school of music, a seminary for priests, training colleges, industrial and art schools, a normal school for Protestant women and a library containing over 110,000 volumes. One of the most attractive features of the place is the beautiful Jardin de la Fontaine (Fountain Gardens). In the days of the Roman Empire Nîmes was one of the most magnificent cities in the provinces. During the Reformation it was a center of Calvinism. Alphonse Daudet, the novelist, was born here. Population in 1921, 82,744.

NIM'ROD, a picturesque character of the time of the scattering of peoples some centuries after the Flood. He was a grandson of Ham and the son of Cush, and is described in *Genesis* X as a mighty hunter, ruler and builder. Originally he ruled the cities of Babel, Erech, Accad and Calneh in the Land of Shinar, or Babylon, and was credited with the founding of Nineveh and adjacent cities at a later date. Nimrod's zeal in hunting gave rise to the saying, "like Nimrod, a mighty hunter before the Lord," which remains the popular impression of the hero. To-day if a man is called *a Nimrod* it means that he enjoys hunting.

NINEVEH, *nin'e veh,* a city of ancient Assyria, founded, according to Biblical narrative, by Nimrod, and becoming, in its later history, the capital of the empire (see ASSYRIA). On the decline of the Assyrian power, Nineveh was taken, in 606 B.C., by a combined attack of the Medes and Babylonians, and so completely destroyed that even its site was forgotten.

In 1820, an Englishman named Rich examined mounds lying on the left bank of the Tigris, opposite the town of Mosul, and concluded that beneath them were the ruins of Nineveh. In 1842, Botta, and later Loftus, Hormuzd Rassam and George Smith, made excavations, with results of the greatest interest. Royal palaces, on raised platforms, filled with

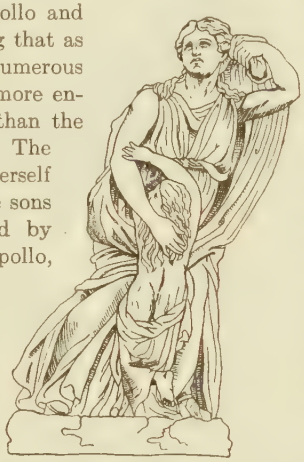
works of art and having alabaster pavements sculptured in carpetlike designs were uncovered; also libraries containing great numbers of stone slabs, prisms, cylinders and tablets in cuneiform inscription. Among the latter are tablets bearing legends of the Creation and the Flood, and a pair of colossal winged bulls and several cylinders describing the wars of Sennacherib, recorded in the Scriptures. Other records bear out the vivid prophecies in *Nahum* and *Zephaniah* of Nineveh's downfall. From results of the excavations, the inner wall of the city is thought to have had a circuit of about eight miles. There were elaborate outworks, moats and defenses. The population is estimated to have been at least 175,000. Many relics of the Ninevite civilization are now in the possession of the British Museum.

Consult Hilprecht's *Explorations in Bible Lands during the Nineteenth Century.*

NING-PO, *ning po',* a walled city of China, one of the five ports opened to foreign commerce by the Treaty of Nanking (1842). It is situated on the east coast of the province of Chekiang, sixteen miles inland on the River

Ning-po. This interesting old city, with its encircling walls twenty-five feet in height, and its temples, stone bridges, flower-covered ramparts and lofty white pagoda, is both an educational and a local trade center. Its library is surpassed in size by only three others in the country; it has several colleges and monasteries, and is the headquarters of a number of Christian missions. Tea, cotton, silk and carpets are important articles of export. Ning-po has little direct foreign trade, as it is primarily a distributing point for the city of Shanghai. Estimated population, 2,172,320.

NIOBE, *ni'o be,* according to the Grecian myth, the daughter of Tantalus, king of Lydia, and wife of Amphion. She had seven strong and talented sons and seven beautiful daughters, but her pride led her to insult Latona, the mother of Apollo and Diana, by claiming that as the mother of so numerous a family she was more entitled to worship than the goddess Latona. The latter revenged herself bitterly, for all the sons of Niobe perished by the arrows of Apollo, and Diana slew every one of the daughters except Chloris, who was wife of King Neleus of Pylos. So great was the mother's grief that the gods in pity turned her into stone, but even then her weeping could not stop, and tears rained down from her sightless eyes. Amphion, dismayed at the disaster, killed himself.



NIOBE
From the statue in the Uffizi Gallery, Florence.

NIP'IGON, formerly also spelled NEPIGON, is a lake in the Thunder Bay district, in southwestern Ontario. Its southern shore is about thirty-five miles north of the nearest point of Lake Superior and about seventy-five miles northeast of Port Arthur, Ont. Nipigon is sixty miles long from north to south and forty-five miles wide, and has an area of 1,730 square miles, or about four-fifths that of Prince Edward Island. Its shore line, 850 miles long, is very irregular, being broken by numerous rocky headlands and deep bays. Innumerable islands lift themselves straight out of the water—rocky, massive, grim, undisturbed by storms. Nipigon lies 813 feet above Lake Superior, into which it discharges through the Nipigon River. The northern shore of the lake is easily reached from the National Transcontinental Railway.

Lake Nipigon is included in the Nipigon Forest Reserve. The region is a good hunting country, especially for moose. Fish, too, are plentiful, especially since the Indians have been forbidden to use nets. Whitefish, sturgeon, speckled trout and pike are the principal varieties; the whitefish sometimes rise to a very small fly, and the sturgeon may be taken with a rod by allowing the bait to rest on the bottom. The waters off the ends of long promontories are especially good for trolling.

NIPISSING, *nip'i sing,* a lake in eastern Ontario, about midway between the Ottawa River and Georgian Bay. It is about fifty-five miles long, has a maximum width of twenty-eight miles, and has an area of 330 square miles. The lake's chief source is the Sturgeon River, which enters it from the north, and its only outlet is the French River, which flows into Georgian Bay. Lake Nipissing is a popular resort for hunters and anglers. It can be reached by the Timiskaming & Northern Ontario Railway, by the main line of the Canadian Pacific and by branches of the Grand Trunk and Canadian Northern. Steamers run regularly in summer from North Bay to other points on the lake and on French River. The proposed Georgian Bay Ship Canal will pass through the lake, and its summit level is the divide between the lake and the Ottawa valley.

Nipissing is an Indian word meaning *still-water place,* or *little-water place.* It was also applied to a tribe of Algonquian Indians who formerly lived in the region. When the French first planted their missions in Canada the Nipissings were one of the most prominent and most powerful tribes, but about 1650 they were defeated and driven far west and north by the Iroquois. Some of them afterwards returned to their old haunts, and the Nipissings still have a village at the Lake of Two Mountains, near Montreal. The Indians who now live on reservations on or near the lake are classed as Ojibwas.

NIRVANA, *nir vah'na.* See BUDDHISM.

NI'SAN, a Jewish calendar month. The name was originally *Abib,* but after the Babylonian captivity it was changed to Nisan. It came at the time of the harvest in Palestine and corresponds nearly to our March. Nisan was the first month of the sacred year of the Jews and the seventh of the civil year.

NITER, *ni't'r.* See SALTPETER.

NITRATES, *ni'trayts,* are salts of nitric acid. Some of them, such as lead, iron and silver, are useful in medicine; others are utilized in the manufacture of fireworks, as barium nitrate, which gives a green light, and strontium nitrate, which gives a beautiful red light. It is as fertilizers, however, that they are chiefly important. Worn-out soil needs new supplies of nitrogen in order to produce good crops. Great fields of Chile saltpeter (sodium nitrate) in South America supply quantities of natural fertilizers (see pages 1332 and 1334 of the article CHILE); and ordinary manure contains a large per cent of nitrogen compounds. Decaying vegetable matter is converted into nitrogen compounds by the action of microscopic organisms in the air and soil. See FERTILIZER.

NITRIC, *ni'trik,* **ACID,** an important mineral acid (*aqua fortis* in the arts), largely used in the manufacture of coal-tar dyes, high-power explosives (see NITROGLYCERINE; GUNCOTTON), as an etching fluid in the arts and as a medicine. It was first prepared about the ninth century by an Arabian chemist, Geber, who distilled a mixture of saltpeter, cyprian vitriol (copper sulphate) and alum. It is now prepared commercially by distilling Chile saltpeter (sodium nitrate) and concentrated sulphuric acid.

In a pure state it is an unstable, fuming, colorless fluid, capable of burning organic tissues by chemical action. On exposure to air it decomposes into lower oxides, and brown fumes of nitrogen peroxide appear. Seventy-six per cent of the acid is oxygen, which is readily given up, making the acid a powerful oxidizing, or reducing, agent. Animal and vegetable matter are quickly corroded by it, giving characteristic yellow stain. It never occurs in a free state, but is found abundantly in combination with potash, soda, lime and magnesia. Traces of it are also discernible in rain water after a thunderstorm. With sodium, potassium and other elements, it forms soluble salts called nitrates.

NITROGEN, *ni'tro jen,* a gaseous, nonmetallic element comprising about seventy-nine per cent of the air. It is colorless, tasteless and odorless, and is fourteen times heavier than hydrogen but lighter than air, of which it is seventy-eight per cent (by volume). Without nitrogen in some form, plants and animals could not live. It does not easily combine with other substances as does oxygen, and therefore serves to dilute the oxygen in the air.

Plants as a rule cannot absorb the nitrogen from the air and must therefore draw their supply from the nitrogen compounds in the soil. Enriching soil with manure, or with some natural fertilizer, such as guano or Chile saltpeter, means, chiefly, putting a much greater quantity of nitrogen compounds into it to be taken up by plant roots. Because it is feared that the supply of nitrogen fertilizers, such as guano, will soon be exhausted, scientists are constantly trying to find a way to make nitrogen compounds artificially from the free nitrogen of the air, but these attempts have not been very successful (see FERTILIZER).

Nitrogen was discovered to be a constituent of air in 1772 by Professor Rutherford of Edinburgh University, who found that there was a new gas left when all the oxygen had been taken out. It was named *nitrogen* because it was known to be a constituent of niter (potassium nitrate). With oxygen (which see) it forms five oxides, three of which are important. Nitrous oxide is the anesthetic *laughing gas,* used importantly in dental work; nitric oxide is a colorless gas containing equal volumes of nitrogen and oxygen; nitrogen peroxide is a reddish-brown gas formed by uniting nitric oxide and oxygen.

In 1911-1912 a new form of nitrogen was announced by Strutt. He observed that after an electric discharge in an atmosphere of nitrogen, the nitrogen continued to glow and give off light, and that under these conditions it combined easily with the metals sodium and mercury when heated, and changed ordinary yellow phosphorus to red phosphorus. The latter is now used to some extent in the manufacture of matches, as a substitute for yellow phosphorus, which is highly poisonous and dangerous to handle (see MATCHES).

NITROGLYCERINE, *ni tro glis'er in,* a highly explosive compound made by pouring one part of glycerine into a cooled mixture of four parts concentrated sulphuric acid and one part concentrated nitric acid. The nitroglycerine crystallizes out when the acids are poured into water. It is a light yellow or colorless, oily liquid, almost insoluble in water, sweet to the taste and very poisonous. It is not easily set afire, but burns with a greenish flame, and when heated to 180 degrees decomposes with explosive violence. It may be exploded by a severe jar, but is easiest set off with a detonator containing fulminate of mercury. The volume of gas liberated is about 10,000 times the volume of the nitroglycerine. Compared

with an equal volume of gunpowder, it has an explosive force thirteen times as great. It is never used alone because of its dangerous explosive properties, but is mixed with clay to make dynamite, or soaked into cotton to make guncotton, for the manufacture of ammunition, firecrackers and blasting mixtures. See AMMUNITION.

NITROUS OXIDE, *ni'trus ok'sid,* the proper name of "laughing gas." The latter name was popularly applied many years ago because when inhaled in small quantities it produces spasmodic action of the facial muscles which somewhat resembles laughing. It is a colorless gas, somewhat soluble in water, and has a faintly sweet odor. When breathed in sufficient quantity it produces anesthesia, or insensibility to pain, the effects of which are not severe and soon pass off. For this reason it is used in dental work. Since it contains a larger proportion of oxygen than does air, such substances as wood, phosphorus and glowing sulphur burn in it almost as brightly as in pure oxygen.

NIX, in the folklore of the German people, the name given to a water sprite, either male or female. Like the water divinities of the Greeks and Romans, Proteus, Nereus and the Naiads, the nixies were supposed to have the gift of prophecy, which they were not always willing to exercise for the good of men. The nixies were particularly fond of music and dancing and sometimes joined in the dance with human beings, but as they were treacherous and often malignant, it was never considered wise to trust them.

NIZHNI NOVGOROD, *nyeez'ne nawv'go roht,* or **NIJNI NOVGOROD,** a city of Russia, founded in 1221, and known as the *Cradle of the Russian Empire* on account of its age. It has also attained celebrity by reason of the great commercial fair which has been held there every summer since 1817. The city is situated 265 miles east of Moscow, at the junction of the Volga and Oka rivers, and is the capital of the government of the same name. The upper part of the city contains the Kremlin, or citadel, the historic buildings, the governor's palace, cathedrals, libraries and schools. The lower town, built along the banks of the Oka and Volga, is the industrial section. The fair is held on a sandy tongue of land between the rivers. It is attended each year by 500,000 visitors and dealers, and the booths for the sales extend along sixty city blocks. Hundreds of apartments have also been erected for the use of those frequenting the fair, and in prosperous years goods having a value of over $125,000,000 are brought there. The city has manufactories of coarse cloth, cordage, soap, leather, glass, flour, machinery and pottery, and there is a thriving trade in corn, salt, iron, tea, fish, groceries and manufactured goods. Population in 1913, 109,000.

NO'AH, the Biblical hero of the story of the Flood, as told in *Genesis* VI-IX. For his righteousness he was chosen of God to preserve life during the Deluge. He was directed to build an Ark of gopher wood, smeared with pitch, into which he and his family retired, with beasts, creeping things and fowls, "two and two . . . male and female." After the receding of the waters after the Deluge of forty days and 120 days of drying the earth, Noah offered a sacrifice on Mount Ararat, where the Ark rested, to which God responded with the promise that the earth should no more be destroyed by a flood. The rainbow was made the visible sign of this covenant.

Noah's sons, Ham, Shem and Japheth, are credited with founding the three great races of mankind. The descendants of Ham are generally believed to have pushed southward into Egypt and Abyssinia, thus peopling Africa; those of Shem into Babylonia, Assyria, Phoenicia, Syria, etc., peopling the greater part of Asia, while the Japhetic, or Aryan races, dividing into two great branches, populated Media, Persia, India and the continent of Europe.

NOBEL, *no bel',* **PRIZES,** five prizes annually awarded to persons, regardless of nationality, who have made valuable contributions in a particular field to the "good of humanity," each prize being one of five equal shares of the income from the estate of Alfred Nobel (1833-1896), the Swedish inventor of dynamite. The will of Mr. Nobel directed that the interest on his fortune of $9,000,000 should be divided each year among five persons, in the following manner. Award should be made—

(1) For the most important discovery or invention in the domain of physics;
(2) In chemistry;
(3) In physiology or medicine;
(4) For the most distinguished literary work of an idealistic nature;
(5) For the most effective work in the interest of international peace.

These prizes have an average value of $40,000 each, and are awarded by several organizations: the prizes for physics and chemistry by the Royal Academy of Science in Stockholm; the prize for medicine by the Caroline Institute,

the faculty of medicine in Stockholm; the prize for literature by the Swedish Academy of Literature in Stockholm; the peace prize by a committee of five elected by the Norwegian Storthing (Parliament). Direct applications for the prizes are not permitted, but candidates must be proposed by some person duly qualified, and the proposal must be in writing. Only literary works that have appeared in print and that have been "proved by the test of experience or by the examination of experts" are considered. The fund is administered by a board of directors elected by fifteen deputies appointed by the awarding authorities. The board holds office for two years.

The following list gives the recipients of the prizes from 1901 through 1916. No peace prize was awarded in 1914, nor in any year during the continuance of the War of the Nations.

YEAR	PHYSICS	CHEMISTRY	MEDICINE	LITERATURE	PEACE
1901..	W. C. Röntgen (G.)	J. H. van't Hoff (D.)	E. A. von Behring (G.)	R. F. A. Sully-Prudhomme (F.)	J. H. Dunant (Swi.) Fr. Passy (F.)
1902..	H. A. Lorentz (D.) P. Zeeman (D.)	E. Fischer (G.)	Sir Ronald Ross (E.)	Th. Mommsen (G.)	E. Ducommun (Swi.) A. Gobat (Swi.)
1903..	H. A. Becquerel (F.) P. and Marie Curie (F.)	S. A. Arrhenius (Swe.)	N. R. Finsen (Dane)	B. Björnson (N.)	Sir W. R. Cremer (E.)
1904..	Lord Rayleigh (E.)	Sir Wm. Ramsay (E.)	I. P. Pawlow (R.)	F. Mistral (F.) J. Echegaray (Sp.)	Institute of International Law
1905..	Ph. Lenard (G.)	A. von Baeyer (G.)	R. Koch (G.)	H. Sienkiewicz (P.)	Baroness von Suttner (Aus.)
1906..	J. J. Thomson (E.)	H. Moissan (F.)	C. Golgi (I.), S. Ramon y Cajal (Sp.)	G. Carducci (I.)	Th. Roosevelt (A.)
1907..	A. A. Michelson (A.)	E. Buchner (G.)	C. L. A. Laveran (F.)	R. Kipling (E.)	E. T. Moneta (I.) L. Renault (F.)
1908..	G. Lippmann (G.)	E. Rutherford (E.)	P. Ehrlich (G.) E. Metchnikoff (R.)	R. Eucken (G.)	K. P. Arnoldson (Swe.) F. Bajer (Dane.)
1909..	G. Marconi (I.) F. Braun (G.)	W. Ostwald (G.)	Th. Kocher (G.)	Selma Lagerlöf (Swe.)	A. M. F. Beernaert (B.) Baron de Constant (F.)
1910..	J. D. van der Waals (D.)	O. Wallach (G.)	A. Kossel (G.)	P. v. Heyse (G.)	Int'l Peace Bureau (Swi.)
1911..	W. Wien (G.)	Marie Curie (F.)	A. Gullstrand (Swe.)	M. Maeterlinck (B.)	T. M. C. Asser (D.) A. H. Fried (Aus.)
1912..	Gustaf Dalén (Swe.)	V. Grignard (F.) P. Sabatier (F.)	A. Carrel (A.)	G. Hauptmann (G.)	Elihu Root (A.)
1913..	H. K. Onnes (D.)	A. Werner (Swi.)	C. Richet (F.)	R. Tagore (Beng.)	H. LaFontaine (B.)
1914..	M. von Laue (G.)	T. W. Richards (A.)	R. Bárány (Aus.)	Not awarded.	Not awarded.
1915..	W. H. Bragg (E.) W. L. Bragg (E.)	R. Willstätter (G.)	Not awarded.	Romain Rolland (F.)	Not awarded.
1916..	Not awarded.	Not awarded.	Not awarded.	Verner Heidenstam (Swe.)	Not awarded.
1917..	Not awarded.	Not awarded.	Not awarded.	Karl Gjellerup (Den.)	Red Cross.
1918..	Not awarded.	Fritz Haber (G.)	Not awarded.	Not awarded.	Not awarded.
1919..	H. Starke (Swe.)	.....	Jules Bordet (B.)	.....	.....
1920..	.....	W. Nernst (G.)	A. Krogh (Dane)	K. Hamsun (N.)	Woodrow Wilson (A.)

A., American; Aus., Austrian; B., Belgian; Beng., Bengalese; D., Dutch; E., English; F., French; G., German; I., Italian; N., Norwegian; P., Polish; R., Russian; Sp., Spanish; Swe., Swedish; Swi., Swiss.

Authoritative information concerning the conditions governing the award of prizes may be obtained by writing to the Board of Directors, Nobel Institute, Stockholm, Sweden.

NOBILITY, *no bil'i ti.* The nobility in a country constitutes a distinct class, born to the enjoyment of certain privileges, which may be of substantial value or of little material worth, but they are not necessarily political. The foundation on which ancient nobility rested was everywhere the same. The stage of development reached in the different countries of Europe presents a puzzling mass of divergent results. Conquest was an influential factor in shaping the origin of privileged classes, hence

of nobility. Wherever history discloses a subject mass of people, like the villeins of early Europe generally, or the serfs of modern Russia, such a people represent tribes reduced to vassalage by conquest, and the conquering tribes constitute a nobility. This was the case in Rome, where the conquering patrician tribes formed the nobility of the Roman Empire. It was the same in Athens. In other parts of ancient Europe, generally under different names, was found a class of freemen and bondsmen.

But another line of development must be noted. The office of various tribal chieftains—civil and military—in the first stage always elective, tended to pass more and more by inheritance, and hence privileged families were formed which, taken collectively, formed a privileged class, or nobility. The result was that in Europe generally society existed in three great divisions—the nobility proper, the final development of the numerous chiefs of an earlier period; the freemen, or the mass of conquering tribes, and the bondmen, the subject tribes of early times. The nobility here spoken of is what the historians mean when they talk about the old nobility of Europe.

In time the distinction between the freemen and bondmen disappeared. One of the most interesting researches in history is to trace this development in the different countries; the old nobility underwent profound changes. In England it was radically changed by the Norman conquest and rise of feudalism. There are now but five classes of nobles in England (see PEER). As a class, they enjoy the substantial right of a seat in the House of Lords, but title and dignity alike pass only to the oldest son, which is a limitation not known to the primitive conception of nobility in Rome. The ideas on which nobility rests belong to a chapter in the world's history now closing. Republics do not countenance nobles, and the Constitution of the United States forbids their creation.

NODE, an astronomical term used to define the points at which the moon, or any other planet in its orbit, cuts the ecliptic. The moon travels round the earth in what is nearly a great circle. The moon and the earth also travel round the sun in a still greater orbit, nearly circular. These circles cross each other, and the points at which they cross are called *nodes.* When the moon passes from the south to the north of the ecliptic, it travels through the *ascending node;* when passing from the north to the south of the ecliptic, it passes through the *descending node.*

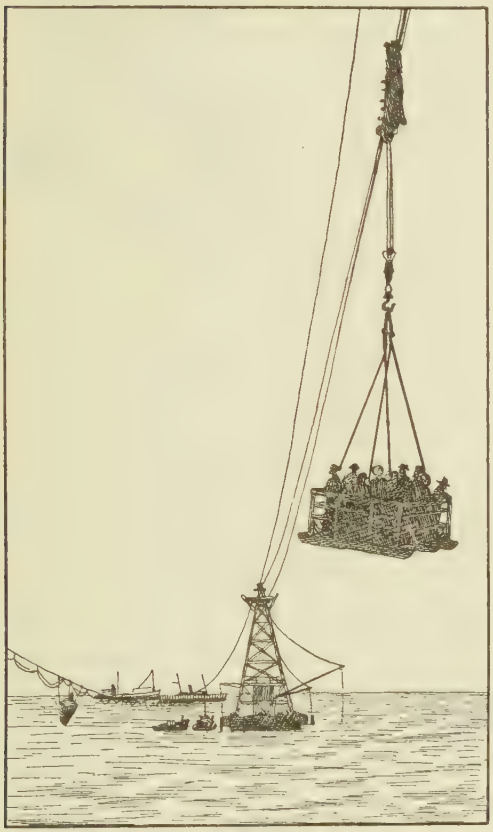
NOGI, *no'ge,* KITEU, General, Count (1849-1912), a Japanese soldier and general, the hero of the siege of Port Arthur during the Russo-Japanese War of 1904-1905. He was born in Choshu, and was a member of the famous caste of the Samurai, Japan's old nobles. In the Satsuma rebellion he served with distinction, and in return for services at the battles of Port Arthur and Kinchow in the war with China was rewarded with the title of peer. In 1896 he became governor-general of Formosa, and at the outbreak of the Russo-Japanese War in June, 1904, was given command of the third army, with orders to attack Port Arthur, one of the most strongly-fortified forts in the world. The siege lasted until January, 1905, and the final ten days' fighting cost the Japanese about 10,000 men. After the surrender of the fortress to the Japanese Nogi joined the forces of Oyama and took an active part in the operations around Mukden (see MUKDEN; RUSSO-JAPANESE WAR).

After the war General Nogi, at the command of the emperor, took the honorary presidency of a school for young women holding titles of nobility, and his chief endeavor for the rest of his life was to revive in his countrymen the old ideals of Spartan life. In accordance with old traditions, both he and his wife committed hara-kiri (which see) on September 13, 1912, in Tokyo, during the funeral services of Mutsuhito, their mikado.

NO'MAD LIFE. In the primitive stage of all peoples there was a period in which they had no settled homes, but wandered about from place to place in search of food. Such a mode of life is called *nomadism,* a term derived from a Latin word meaning *roaming.* Some of the savage tribes of the forest regions of equatorial Africa, South America and the East Indies yet lead nomad lives. Nomadism is also practiced to-day by certain peoples whose livelihood depends upon the raising of horses, sheep and cattle. In Arabia and Mongolia, in the desert regions of Central Asia and in the Navaho reservations of Arizona and New Mexico, regions unsuited to agriculture because of climatic conditions, the people live a nomad life. These areas produce grass in sufficient quantity to support large numbers of animals if they are driven from place to place. This form of nomadism is designated as *pastoral,* and was practiced by the early Hebrews of Bible times. Pastoral nomads are higher in civilization than the savage tribes mentioned above, but their mode of life is much simpler

than that of settled peoples. Their houses are tents, they have no furniture, as that term is commonly understood, and their dress is more or less primitive. See CIVILIZATION.

NOME, *nohm,* a city on the southern coast of Seward Peninsula, the westernmost projection of Alaska. Nome is not only the largest city of the peninsula, but is the commercial, educational and judicial center as well. It is



LANDING AT NOME

Vessels cannot reach the shore at Nome during violent storms, which often prevail, and an aerial tramway has been built to facilitate speedy release of cargo and passengers.

situated in a prosperous gold-mining district, and occupies an exposed position on Norton Sound, an arm of Bering Sea (see colored map of Alaska in Volume I). Seattle, Wash., is 2,871 miles distant, and the two cities enjoy steamer connection only between June and October. Nome began as a mining camp, the first settlement having been made in 1899, when valuable beach deposits of gold were discovered. At the present time it has substantial office buildings, hospitals, a courthouse, a post office, modern sewerage, water and electric-light systems and telephone service, and enjoys railway connection with Shelton, eighty-five miles distant. The city is completely organized. Population, 1920, 852. During the early rush of gold seekers, when discoveries were made in the Klondike region, Nome had a population of over 12,000.

NONCONFORMISTS, *non kon form'ists,* the name applied in a general sense to those who refuse to conform to the regulations of an established religion. Specifically, the term is used most commonly in connection with the Protestant dissenters of England. In 1662, two years after the restoration of Charles II, an Act of Uniformity was passed which expelled from churches and schools throughout England every minister and teacher who did not within a stated time declare his assent to the Book of Common Prayer. As a result fully 2,000 clergymen and teachers, known as *Nonconformists,* vacated their positions. Other repressive measures followed, but relief was obtained by the Toleration Act of 1689, passed after the downfall of the House of Stuart and the accession of William III. Since that time there has been a gradual advance in religious toleration, and at the present time Nonconformists in England, such as the Wesleyan Methodists and Baptists, have full religious and civil rights.

NONES, *nohnz,* one of the three divisions into which the Romans divided their calendar month, the others being the Ides and Kalends. The Nones were the seventh day of the months March, May, July and October, and the fifth day in the remaining months. The Ides (which see) were the fifteenth day of the four months named, and the thirteenth of the others; and the Kalends were the first day of each month. Days were reckoned, not as the first, second or third day of the month, but as the days before the Nones, if between the Kalends and the Nones; and the days before the Ides, if between the Nones and the Ides. The remainder were the days before the Kalends of the next month. The Nones received their name from being the ninth day before the Ides (from the Latin *nonus,* meaning *ninth*), both days included. See CALENDAR.

NON-INTERCOURSE ACT, in American history, an act passed by Congress in 1809, as a retaliatory measure against France and England during their wars for their interference with American commerce. It prohibited trade with both countries, but permitted American ships to visit ports of other European countries. The causes leading up to the passage of

the Non-Intercourse Act are explained in these volumes in the article EMBARGO. In 1811 the act so far as it related to France was repealed, but the breach with England continued, and in 1812 that country and the United States began open warfare. See WAR OF 1812.

NONPARTISAN LEAGUE, an organization of farmers of the Northwestern United States, particularly in Minnesota and the two Dakotas, calling itself a reform party. It advocates state ownership of many utilities heretofore conceded by right to private interests, such as banks and grain elevators. The League controls North Dakota; in 1918 and 1920 it elected every state officer, but in 1921 the recall was invoked and the governor was put out of office. The further success of the League seems to be open to question.

NORDENSKIÖLD, *naw'ren shul',* NILS ADOLF ERIC, Baron (1832-1901), a famous Swedish explorer, the discoverer of the Northeast Passage, which had been diligently sought for four centuries. He was born at Helsingfors, in Finland, but in 1857 removed to Stockholm and became a citizen of Sweden. In 1858 and again in 1861 he accompanied Torrell on voyages to icebound Spitzbergen, making important geological discoveries, and in 1864 and 1867 led expeditions to that region. On the second of these he reached latitude 81° 42′, the farthest northern point attained up to that time. An investigation of the ice fields of Greenland occupied him during much of 1870, and in 1872 he led another and comparatively unsuccessful expedition to Spitzbergen.

It was in 1878-1879 that he discovered the Northwest Passage and cruised through it on the *Vega.* His account of his experiences is contained in *The Voyage of the Vega.* For this service to the world King Oscar of Sweden created him a baron in 1879. On his last voyage to Greenland, in 1883, he performed the unprecedented feat of forcing his ship through the ice barrier. His works include two important books on geography, *Facsimile Atlas* and *Periplus.*

NORDICA, *nawr'di ka,* LILLIAN (1859-1914), one of the foremost dramatic sopranos of her time. She was born in Farmington, Me., her family name being Norton. She studied in Boston, Italy, London and Milan and made her début in grand opera in Paris, in 1881, in *La Traviata.* In 1883 she made her first appearance in grand opera in America as Marguerite in *Faust.* Madame Nordica appeared at the Bayreuth festival, in 1894, singing the part of Elsa in Wagner's *Lohengrin.* Her success was sensational and she returned to America the same year and achieved the crowning success of her career in *Tristan and Isolde,* with Jean and Edouard de Reszke, at the Metropolitan Opera House, New York. Subsequently she appeared almost exclusively in Wagnerian opera. Her last tours were devoted mainly to concert work under her own management; on her final tour, begun in 1913, she was shipwrecked off the coast of Thursday Island, Australia. As a result of exposure she died May 10, 1914, at Batavia, Java.

LILLIAN NORDICA

NORFOLK, *nawr'fawk,* VA., the largest peanut market and one of the most important coaling stations in the world, and one of the principal naval stations of the United States. It is situated in the southeastern part of the state, on the Elizabeth River, opposite Portsmouth. Richmond, the state capital, is about 100 miles northwest by rail and 116 miles by water. Railway transportation is provided by the Chesapeake & Ohio; Norfolk & Western; Norfolk Southern; Virginian; Southern; New York, Philadelphia & Norfolk; Atlantic Coast Line, and Seaboard Air Line. The port is the terminus for transatlantic and coastwise steamship lines, and water communication with inland towns is made through the Dismal Swamp and Albemarle and Chesapeake canals. Ferries connect with Portsmouth, Newport News and Old Point Comfort, and electric lines extend to Virginia Beach, Cape Henry, Ocean View and Willoughby Beach, along the coast. The population increased from 67,462 in 1910 to 115,777 in 1920 (72 per cent gain); in size the city ranks next to Richmond among the cities of the state. Its area exceeds seven square miles.

Commerce and Industry. Norfolk has a beautiful harbor of such ample proportions that it could shelter the combined navies of the world. It is defended by Fort Monroe and Fort Wool. The navy yards are at Portsmouth, and these two cities together constitute a Federal customs district. More than 2,500,000 tons of coal are annually handled by the immense coaling station here. The principal commerce

of the port is in cotton, coal, lumber, vegetables, fruits, peanuts, oysters, grain and fertilizer; it is one of the leading shipping points in the United States for strawberries. Norfolk is rapidly developing into an industrial center, and has large lumber, cotton, knitting, silk and cottonseed-oil mills, fertilizer and tobacco factories, creosoting works, foundries, ship- and boat-building yards, and stock yards.

Buildings and Institutions. Among the noteworthy buildings are the customhouse, post office, city hall, city market, Cotton Exchange, Bank of Commerce, Royster and Y. M. C. A. buildings, Union Station, an armory, the Naval Y. M. C. A. headquarters and the Board of Trade. Saint Paul's Church, erected in 1732, is the most noted place of worship; other important buildings are Saint Vincent de Paul's, Norfolk Protestant and Sarah Leigh hospitals. The city has several private secondary schools; among these are Norfolk Academy, one of the oldest preparatory schools in the South, and Norfolk Mission College, for colored students. There is a Carnegie Library.

History. The town was organized in 1682, and was incorporated as a borough in 1736. In 1776 the place was burned and almost completely destroyed by the British under Lord Dunmore; Saint Paul's Church is the only remaining structure of the old city. In 1855 Norfolk suffered an epidemic of yellow fever, which was brought to its port by the man-of-war *Benjamin Franklin.* During the War of Secession, the city was the principal naval station of the Confederacy. In 1906 the suburb of Berkely was annexed and a new charter was granted.

NORFOLK ISLAND, an isolated island in the South Pacific Ocean 500 miles northwest of New Zealand, discovered by Captain Cook in 1774. It is now politically attached to New South Wales, Australia. It has an area of ten square miles, with mountains rising to a height of 1,040 feet. The magnificent Norfolk Island pine is found in its forests. Most of the inhabitants are descendants of the members of the expedition ending in the *Bounty Mutiny,* who were transferred here from Pitcairn Island in 1856, and the total population numbers about 870.

Norfolk Island was used as a penal settlement by New South Wales until 1851, and is now governed by that Australian state through a resident magistrate.

NORMAL SCHOOLS. See SCHOOL, subhead *Schools for Teachers.*

NORMAN ARCHITECTURE, a style of building developed by the Northmen (Normans) after their permanent establishment in France. Norman architecture is regarded as a variety of Romanesque; it prevailed from about the year 1000 until the thirteenth century, when it gave way to the Gothic school. This style of building is best studied in connection with the churches and monasteries which the Normans erected to replace those they had destroyed in their career of conquest. They made use of the cross-groined vault, and their adoption of diagonal ribs to strengthen the groined vault was a distinct innovation.

Another important step was their plan of building interior passageways in thick walls, which had the effect of making such walls double. From this came the custom of making a window or arcade in the inner wall opposite the one in the outer; the eye could thus view one design through the other, and the effect was charming. The influence of this innovation is seen in the exquisite double tracery of the Norman-Gothic cathedrals of the thirteenth century. In their treatment and use of bell towers, turrets and spires the Normans made wonderful progress, and their ornamentation, always characterized by restraint and good taste, never showed the weakness of the too-florid style of decoration. The donjon, or keep, type of castle is another monument of their genius. The churches at Caen, Normandy, are good examples of the Norman style.

Related Subjects. The reader is referred to the following articles in these volumes:

Architecture	Normans
Normandy	Vault

NORMAN CONQUEST. See WILLIAM I, THE CONQUEROR.

NORMANDY, *nawr'man di,* the old name of a fertile and prosperous region in France bordering on the English Channel, which Charles the Simple granted as a fief to the Normans in 912, after their settlement at Rouen under their chief Rollo, or Hrolf (see NORMANS). The province is now divided into the departments of Seine-Inférieure, Eure, Calvados, La Manche and Orne. Among its important towns and cities are Rouen, the capital of old Normandy; Havre, Harfleur, Caen, Bayeux and Cherbourg. The inhabitants are descendants of the old Normans, and like them are an intelligent, strong and energetic people.

From the Norman chief, Rollo, descended the line of dukes whose most celebrated representative was William the Conqueror. He be-

came king of England in 1066, thus politically uniting his two domains. His son Robert, however, wrested from him his French province in 1077, and it was not again united with England until 1106. Reconquered for France in 1202-1204 by Philip Augustus, Normandy was twice won by the English during the Hundred Years' War, but it was finally recovered by the French in 1449, becoming then a permanent possession of France. The Channel Islands, once a part of Normandy, belong now to Great Britain.

Consult Home's *Normandy;* Mansfield's *Rambles in Normandy.*

NORMANS, *nawr'manz,* the name applied in history to the Northmen, or Norsemen, from the Scandinavian peninsula, who established themselves permanently in France. From *Norman,* which itself is a softened form of *Northmen,* comes the word *Normandy,* the name given the old French province founded by those people. The Norsemen began to make raids upon the coasts of France during the reign of Charlemagne, and in 845, thirty years after his death, they plundered Paris. After several years of invasions and forays, which the later kings of the Carolingian dynasty were unable to prevent, Charles the Simple granted to Rollo, the leader of the Northmen who had established a colony at Rouen, a tract of land in the northern part of Gaul. In return, Rollo pledged himself to render Charles homage and to adopt Christianity. This was in the year 912. For the next hundred years the Northmen, or Normans, prospered in their adopted country, taking on the refinements of civilization and becoming the most cultured people of Europe.

Then, early in the eleventh century, the spirit of adventure revived, and the Normans made their way for purposes of conquest into Southern Italy and Sicily, establishing there a state which is known historically as the Kingdom of Naples and Sicily. Famous among the Norman leaders of this period is Robert Guiscard. His renown, however, was soon to be eclipsed by that of Duke William of Normandy, who led an army into England in 1066 and defeated the English king, Harold, at the Battle of Hastings. As a result, William gained the throne and a Norman dynasty ruled in England until 1154.

Related Subjects. The following articles will be of interest in this connection:

England, subtitle *History*
Hastings, Battle of
Norman **Architecture**
Normandy
Northmen
William I (England)

NORNS, *nawrnz,* the three fates of Norse or Scandinavian mythology, whose decrees were beyond recall. They were represented as three sisters of different ages, whose names were Urd, Verdandi and Skuld, meaning the *past, present* and *future.* Urd, as the personification of former days, was represented as old and feeble, ever looking backward; Verdandi, typifying the present, appeared as a courageous, energetic young woman, who looked always straight ahead; Skuld, emblematic of the future, was closely veiled and appeared with head turned in the opposite direction from that toward which Urd looked, and in her hand was an unopened book or a scroll not yet unrolled. Asgard, the home of the heroes slain in battle, was their dwelling place, and they were supposed to sit under the world tree, Yggdrasil, by the well of Urdar, and there determine the destinies of both gods and men. There were many lesser norns, each individual having a personal one who decided his fate. The inferior norns also included women who possessed the power of magic or prediction.

NORRIS, Tobias Crawford (1861-), a Canadian statesman, who succeeded Sir Rodmond Roblin in 1915 as premier of Manitoba. Norris was born at Brampton, Ont., but while still a young man he removed to Manitoba, where he engaged in farming, and later became an auctioneer of live stock. After some years he began to take an active part in politics, first in municipal campaigns and later in provincial elections. He was elected as a Liberal to the Manitoba legislature, and after service of over fifteen years, on the downfall of the Roblin government in May, 1915, he formed a new ministry.

NOR'RISTOWN, Pa., a borough in Montgomery County, of which it is the county seat, is situated in the southeastern section of the state on the Schuylkill River and canal. Philadelphia is eighteen miles southeast, and Reading is forty-one miles northwest. Bridgeport, across the river, is connected with Norristown by a bridge. Transportation is provided by the Pennsylvania, the Stony Creek and the Philadelphia & Reading railways, and electric lines extend south from the city. The township in which Norristown is now located, known then as the Manor of Williamstadt, was given by William Penn to his son, William Penn, Jr., in 1704. It was sold to Isaac Norris and William Trent, and later became the sole possession of Norris, for whom the borough is named. It was incorporated as a borough in 1812. In

1910 the population was 27,875; by 1920 it had increased to 32,319 (15 per cent gain). The area of the borough is three and one-half square miles.

Norristown is noted for the variety of its manufactures. It has a large output of knit goods, hosiery and underwear, and produces a great variety of foundry and machine-shop products; it also makes rugs, carpets, glass products and cigars. Near by are marble, granite and limestone quarries. Noteworthy buildings are the post office, built of marble, the county courthouse, city hall, county jail, Masonic Temple, the state hospital for the insane, Saint Joseph's Protectory for girls, and a home for aged women. Besides the public schools, there are the public and McCann libraries, two business colleges and the Montgomery Historical Society. Features of interest are Island Park and the memorials to Winfield Scott Hancock and John F. Hartranft, American military leaders, who were born in Montgomery County. Valley Forge is six miles distant. R.H.

NORTH, Christopher, the pen name of the Scotch writer, John Wilson (which see).

NORTH, Frederick, Lord, Earl of Guilford (1732-1792), an English statesman who by his uncompromising attitude toward the English colonies in America did much to bring on the American Revolutionary War. He studied at Eton and at Trinity Colleges, Oxford, and in 1754 entered Parliament. After serving as junior of the treasury, as paymaster and as a member of the Privy Council, he became, in 1767, chancellor of the exchequer and leader of the House of Commons. It was while he held this post that the duty on tea was imposed which so stirred the American colonies.

In 1770 North became prime minister, but George III practically dictated his policies and held him to them even after North himself had become convinced that they were ruinous. Although he renounced in 1778 his right to tax the colonies, it was not until 1782 that he resigned his office. In his personal character North was all that was estimable, but his subservience to the king prevented his accomplishing anything of note in his country.

NORTH ADAMS, Mass., a manufacturing city in Berkshire County, in the extreme northwestern part of the state. It is situated on the Hoosac River, near the western terminus of the famous Hoosac Tunnel, five miles from the state line of Vermont and ten miles from that of New York. Pittsfield is twenty-three miles south, and Albany, N. Y., is thirty-six miles west. The Boston & Albany and the Boston & Maine railways and electric lines serve the city. The first settlement, made in 1765, was a part of Adams until it was incorporated as a town in 1878. It was chartered as a city in 1895, its limits including the villages of Brayton, Greylock, Blackington and Beaver. The population in 1910 was 22,019; it was 22,282 in 1920, a gain of one per cent. The area of the city is nearly twenty square miles.

The city has a picturesque location, at the foot of Greylock Mountain, the highest peak of the state, and in the midst of the Berkshire Hills, famed for their beauty. Hudson Brook is here spanned by a natural bridge, fifty feet above the water. North Adams has a Federal building, a state normal school, Drury Academy and a public library. The leading industrial establishments are cotton, woolen and print mills, boot-and-shoe factories, machine shops and creameries; the trade is chiefly in manufactures and dairy products. In 1920 there were 65 factories; 6,023 wage-earners; invested capital, $25,332,000.. Here, in 1746, Fort Massachusetts was captured by French and Indians under Vaudreuil. F.C.O'C.

NORTH AMERICA. About the year 1000, when learned geographers were still teaching that the Atlantic Ocean was the western limit of a saucerlike world, a part of the stream which circled its edge, a band of hardy Norsemen returned to Iceland from a westward voyage in their vikings' boat, bringing stories of a marvelously fair country which they called Vineland the Good. But these early explorers no more dreamed than did the erring scholars

that they had seen a new world, a continent of which the poet Bryant could later sing:

Oh mother of a mighty race,
Yet lovely in thy youthful grace!
* * * * * * *
On thy cheeks the glow is spread
That tints thy morning hills with red;
Thy step—the wild deer's rustling feet
Within thy woods are not more fleet;
Thy hopeful eye
Is bright as thine own sunny sky.

"A Land Flowing with Milk and Honey." Only four centuries have passed since Columbus' search for India revealed a far larger and richer land, but in that time North America has become the cradle of two great liberty-loving Anglo-Saxon nations and of nearly a dozen Latin commonwealths which, whatever their shortcomings, have been bulwarks in the world-wide struggle for freedom. Because of the freedom which these countries have possessed, they have been able to set new standards of progress for the Old World and to develop without hindrance their natural riches. Though they contain less than one-tenth of the world's people, these North American nations have amassed half the world's wealth and have made their continent its greatest supply house. They give the world nearly half its breadstuffs and more than that proportion of the cotton for its clothes; almost half its coal and two-thirds of its newer fuel, petroleum; nearly all its silver and a large part of its gold; over half the copper which makes modern electrical industry possible, and nearly as large a share of its iron, the chief of all minerals.

To this wonderful continent, the greater part of which lies in the north temperate zone and has a climate suited to bring out the best qualities of the white man, have come people of all nations to mingle their blood in the formation of a new race:

In her form and features still
The unblenching Puritan will,
Cavalier honor, Huguenot grace,
The Quaker truth and sweetness,
And the strength of the danger-girdled race
Of Holland, blend in a proud completeness.

So Bayard Taylor saw the spirit of America, and since his time it has been enriched with the virtues of many nations.

Shape, Location and Area. Not until Magellan's ships sailed across the Pacific in 1521 did men know that the New World had on its western side an ocean even broader than the Atlantic, over which the explorers had come from Europe. Eight years earlier Balboa, in search of a land of gold, had crossed the Isthmus of Panama, but as this neck of land only thirty miles wide which joins the two Americas runs from east to west, he thought he had found a southern ocean. That the frozen Arctic Ocean forms America's northern boundary, no one really knew until the nineteenth century.

Had Columbus voyaged north instead of west he could nevertheless have found America, for the easternmost point of the island of Greenland is in the longitude of the west coast of Ireland. But he would not have been the discoverer of a New World, for Greenland was already colonized by the Scandinavians. The land which he found was near the other end of a line drawn along the American coast. So far toward the southwest does this line slant that the first shores which Columbus saw were farther west than all but a small corner of South America. From the end of the line, in tropical Panama, another line drawn in a northwesterly direction to the Arctic Circle, where Asia is only thirty-six miles away, across Bering Strait, marks the Pacific coast. A third line connecting the first two can be drawn along the north coast, for like all the earth's great land masses North America is a south-pointed triangle.

The north and east sides of this triangle are broken and twisted by numbers of gulfs and bays, islands and peninsulas, but the west side is remarkably straight. Its chief irregularity, the long and narrow Gulf of California, runs parallel with it, and the necklace of islands flung westward from Alaska to a point half way round the world from Eastern Greenland is too delicate to break the impression of symmetry. On the east, as though some mighty giant had taken a bite of the continent, is the half-circle of the Gulf of Mexico, nearly enclosed by the peninsulas of Florida and Yucatan and the eastward-stretching West Indies. Farther north a gap between Labrador and Greenland is formed by Davis Strait, and the whole northeastern corner of the triangle is broken up into islands, large and small, inside of which lies Hudson Bay.

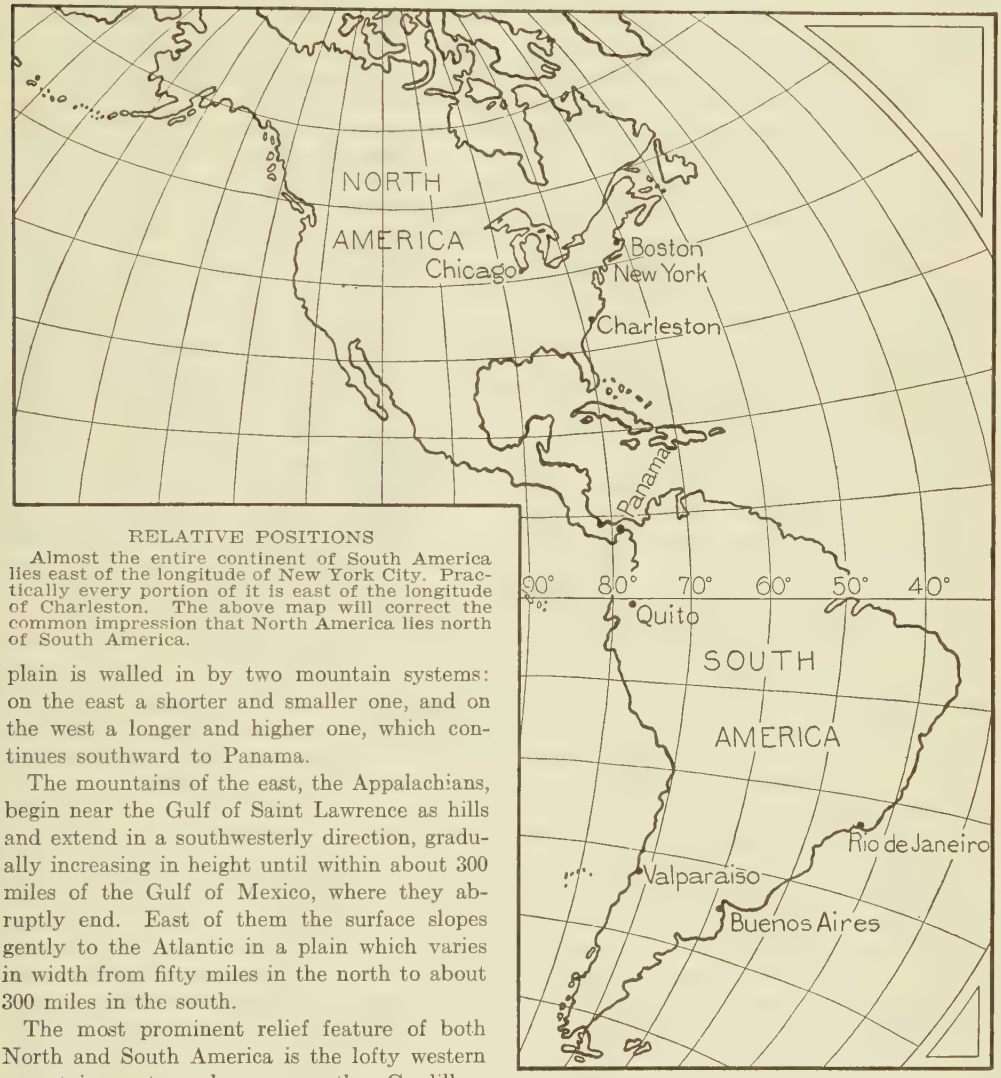
The greatest breadth of the continent, from east to west, is a little more than 3,000 miles, and its length from north to south is about 4,500 miles. The area is approximately 8,300,000 square miles, a little over half of the area of Asia.

The Mainland, Its Mountains and Plains. North America is built on a gigantic scale. It contains some of the highest mountains, the most extensive plains, the largest lakes and

many of the greatest rivers in the world. Though it possesses physical features of every sort, their arrangement is simple. The greater part of the continent is occupied by a central plain, the largest in the world, stretching across it from north to south and extending from the Arctic Ocean to the Gulf of Mexico. This plain is walled in by two mountain systems: on the east a shorter and smaller one, and on the west a longer and higher one, which continues southward to Panama.

The mountains of the east, the Appalachians, begin near the Gulf of Saint Lawrence as hills and extend in a southwesterly direction, gradually increasing in height until within about 300 miles of the Gulf of Mexico, where they abruptly end. East of them the surface slopes gently to the Atlantic in a plain which varies in width from fifty miles in the north to about 300 miles in the south.

The most prominent relief feature of both North and South America is the lofty western mountain system, known as the Cordillera (which see). Its chief range in North America is the Rocky Mountains. The system attains its greatest width in the United States, where it encloses a plateau varying from 3,000 to 10,000 feet in height and from a few miles in width near its southern extremity to a breadth of over 1,000 miles in Utah and Colorado. The western mountains cover about one-third of the whole area of the continent, with the result that the mean elevation of North America is 2,300 feet above sea level, more than twice as high as that of Europe. Many of the peaks are more than 14,000 feet high, and one, Mount McKinley in Alaska, rises 20,300 feet above the ocean.



RELATIVE POSITIONS

Almost the entire continent of South America lies east of the longitude of New York City. Practically every portion of it is east of the longitude of Charleston. The above map will correct the common impression that North America lies north of South America.

Rivers, Lakes and Harbors. The early explorers of the eastern half of the United States and Canada found their work made easier by nature's generous provision of lakes and rivers. Cartier, in 1534, discovered that the broad Saint Lawrence led into the heart of the continent, and French explorers of a later date found that it was fed by five inland seas, the most ex-

tensive bodies of fresh water on the globe. Journeying up the valleys of some of the rivers which lead from these Great Lakes, they found their way to the "Father of Waters," the mighty Mississippi, whose lower course, near the Gulf of Mexico, had been visited by the Spaniard De Soto in 1541. With its numerous tributaries this stream drains a million and a quarter square miles, furnishes 14,000 miles of inland navigation and discharges more water than all the rivers of Europe. The Missouri-Mississippi is the longest stream in the world. East of the Appalachians the streams all flow directly to the Atlantic (see map of them in the article FALL LINE).

In other parts of the continent neither early explorers nor present-day merchants have found waterways so valuable as those by which the East is served. Along a straight line from the Great Lakes to the northwest corner of Canada is a series of large lakes, in and out of which flow a number of long, north-bound rivers, the Saskatchewan-Nelson, Mackenzie and others, but the system is of little commercial importance because of the desolate nature of the greater part of the territory which it drains. On the west coast only two rivers are valuable to navigation, the Yukon, which opens the heart of Alaska, and the Columbia. One other, the Colorado, drains a large area, but its greatest gift to man is the majestic scenery of its mighty canyon. Between the headwaters of this river and those of the Columbia lies the Great Basin, a region whose streams never find the sea, but disappear in the desert or end in salty lakes. Within the tropics North America has not one great river, but just north of them the Rio Grande, or *Great River,* reaches the Gulf of Mexico, bringing water from the eastern slope of the Rockies.

The historian Thwaites has remarked that "North America could not, in a primitive stage of the mechanic arts, have been developed by colonization on a considerable scale from the west, except in the face of difficulties almost insuperable." If there were only two natural harbors between Gibraltar and Norway, and mountains rose almost directly from the sea, the situation in Western Europe would be about the same as it is between the Canadian border and the tip of Lower California. The coast of British Columbia and Alaska, like that of Norway, has innumerable twists and turns, but is mountainous, and Western Mexico has but few harbors. On the east coast of the continent, on the other hand, there are good harbors all the way from Labrador to Panama. Many of them are small, and some are nearly blocked by sand or coral reefs, but others are among the finest in the world.

A Continent of Wonders. For the lover of the beautiful in nature, no other part of the earth can equal North America. Whether the search is for the awe-inspiring or for simple beauty, nowhere else can such a wide variety of scenes be found. The fascinating constancy of the mighty flood at Niagara and the thought-compelling profoundness of the Grand Canyon are not equaled elsewhere, nor has nature elsewhere exceeded the ever-varying charm of the Yosemite and the Yellowstone, the stern solemnity of the Canadian Rockies, or the picturesque ruggedness of the labyrinth of Alaskan fiords. A landscape painter could find in North America almost any variety of scene—in the eastern section wooded hills and mountains; farther west the rolling, treeless prairie; then the great plains, the snow-crowned mountains and the rainless land of sagebrush and cactus; the sunny valleys of California and the giant forests running northward to British Columbia and Alaska; in the far North the frozen, trackless wastes and the region where trees are stunted by the cold; in the south the countries where frost is never known, where forests become jungles and man must restrain instead of encourage nature.

Climate. Most of North America has a climate that is temperate but characterized by very cold winters and very hot summers. The great central plain of the United States and Canada is exposed to extremes of temperatures and to sudden changes because the position of the mountains is such as to allow both the cold winds from the north and the warm winds from the south to sweep across it. The Pacific coast is remarkable for its uniform temperature, which averages little above 60° Fahrenheit on the coast of Southern California and little below it on the south coast of Alaska. In the latter region the thermometer seldom registers zero Fahrenheit, though its latitude is that of Labrador on the Atlantic coast, which is affected by a cold current from the north, and has such severe winters that it is scarcely inhabitable. Labrador is only 10° Fahrenheit cooler than Northern Germany in July, but it is about 40° Fahrenheit colder in January. The table-lands of Mexico have a tropical but healthful climate, while in the northern part of the continent Arctic temperatures prevail. Central America, at the extreme south, lies

wholly within the torrid zone and has a typical tropical climate.

The Pacific coast, especially north of Mexico, has a heavy rainfall, but the winds blowing towards the east are unable to carry their moisture past the high mountains. For this reason the great plateau region is in places a desert. The shores of the Gulf of Mexico have an abundant rainfall, and the Atlantic coast is nearly as well watered. Details of rainfall can be found on the accompanying map.

Vegetation. Considering the great extent of territory, the differences in the topographical features and the variety of climate, it is natural to find in North America a varied vegetation. In the severe climate of the far North, the

RAINFALL MAP

vegetation consists of lichens and reindeer mosses and those flowering plants which mature during the few weeks of the Arctic summer. The southern border of this region is marked by willows and other shrubs, and a little southward are forests of cone-bearing trees—spruce, fir, hemlock and pine. Some of the most extensive forests and the largest individual specimens of conifer trees in the whole world are found on the Pacific coast.

In the eastern highlands, forests of hard wood and pine are found generally distributed as far south as the Gulf of Mexico. In the south, these forests consist largely of yellow pine, cypress and several kinds of magnolias. The great plains are generally treeless, except along the banks of streams, but originally they were covered with a heavy growth of grass. An extensive growth of cactus is found in the southwestern part of the United States. The vegetation along the Gulf coast, in Mexico and in Central America, has a decidedly tropical character, with large forests of mangroves, palms and giant bamboos. The rubber tree, the silk-cotton tree, the logwood and the mahogany tree grow in this region. Over the larger part of North America most of the cultivated plants and fruit trees start to grow late. The great heat of the summer and the relatively dry autumn promote rapid growth and thorough ripening both of cereals and of fruit. For more detailed descriptions see the articles devoted to the separate countries.

Animal Life. The fauna of North America is to a great extent identical with that of Europe and the northern and central parts of Asia. In the extreme north the most important animals found are the walrus, the polar bear, the caribou, or American reindeer, the fur seal, the Arctic fox, the beaver, the otter, the marten and other fur-bearing animals. In the southern belt of this region, extending as far south as Northern Maine, are found the moose and the deer. Large herds of bison formerly roamed over the central plain, but these animals are now nearly extinct, and only a few herds are found in national and private parks. Among the animals which are characteristic of North America are the puma, or American lion, the grizzly bear, the gopher, or pouched rat, the muskrat, the prairie dog, the Canadian porcupine, the raccoon, the skunk, the musk ox, the bighorn, or Rocky Mountain sheep, the pronghorn, or Rocky Mountain goat, and the opossum.

Among the native birds of this continent are the Baltimore oriole, the bobolink, the cowbird, the flycatchers, the wild turkey and the many species of wood warblers. The reptiles are not conspicuous, most of the snakes being harmless. The only venomous species are the rattlesnake, the copperhead and certain varieties of water snake. The largest reptile on the continent is the alligator, which is found in the lagoons around the Gulf of Mexico. The United States is richer than any other part of the world in river mollusks, especially river mussels. There are thousands of species of insects, including flies, moths, butterflies, bees and beetles. Some of these are noted for their gorgeous hues. The fauna of the lowlands of Mexico, of Central America and of the West Indies belongs to that of South America, which differs from that of the northern continent.

OUTLINE AND QUESTIONS ON NORTH AMERICA

Outline

I. Position

(1) Latitude, 8° to 83° north, including islands
(2) Longitude, 47° 30″ to 168° west
(3) Relation to other continents
  (a) Closeness to Asia in northwest

II. Shape and Size

(1) Triangular in shape
  (a) Point to the south
  (b) Similarity in this respect to other continents
(2) Third in size of the continents, Asia and Africa being larger
(3) Greatest length, north and south, about 4,500 miles
(4) Greatest breadth, east and west, about 3,000 miles
(5) Area
  (a) Actual, approximately 8,300,000 square miles
  (b) Comparative — somewhat more than half that of Asia
  (c) Part occupied by each great political division

III. Physical Features

(1) Character of coast line
  (a) North and east sides broken
  (b) West side comparatively regular
  (c) Harbors
    1. Character
    2. Greater number on east coast
(2) Coast waters
(3) Relief
  (a) Central plain
  (b) Bordering mountains
    1. Appalachians
    2. Rocky Mountains
    3. Less important ranges
  (c) Average elevation
    1. Comparison with that of other continents
  (d) Lofty peaks
    1. Comparison with those of other continents
(4) Rivers
  (a) The longest river in the world—the Missouri-Mississippi
  (b) Other great rivers
  (c) Importance in the history of the developing of continent
  (d) Watersheds
  (e) Drainage areas
(5) Lakes
  (a) Greatest in the world in this continent
    1. Great Lakes

IV. Climate

(1) A "temperate" climate
  (a) Hot summers and cold winters
(2) Extremes in Mexico and Northern Canada
(3) Effect of position of mountains
(4) Effect of oceans and ocean currents
(5) Rainfall
  (a) Effect of mountains

V. Vegetable and Animal Life

(1) Effect of topographical features and climate on vegetation
(2) Zones of vegetation
  (a) Northern zone of scanty vegetation
  (b) The forests of cone bearers
  (c) Treeless plains
  (d) Desert vegetation
  (e) Food plants
(3) Relation of animal life to that of other continents
(4) Zones of animal life
(5) Most characteristic animals
(6) Birds and reptiles
(7) Lower forms of life

VI. Native Peoples

(1) Indians
(2) Eskimo

VII. Resources

(1) Soil fitted to growth of all temperate-region and many tropical plants
(2) Vast mineral wealth
  (a) Coal
  (b) Iron
  (c) Gold
  (d) Silver
  (e) Copper
  (f) Petroleum
(3) Forests
(4) Power-furnishing rivers
(5) Fisheries

VIII. Political Divisions

(1) Independent countries
  (a) United States
  (b) Mexico
  (c) Central American republics
(2) Dependencies of Great Britain
  (a) Canada
  (b) Newfoundland
  (c) British Honduras

Questions

Mention two physical features in which North America surpasses all the other continents.

How can it be said with truth that Columbus would have found America had he traveled north instead of west?

How would the climate of the "Great American Desert" be affected if the Rocky Mountains could be removed?

What was the very first name, so far as is known, that was ever bestowed on North America by the white men?

For what was Columbus searching when he discovered this continent? What land did he think he had reached?

About how large a part of the world's population lives on this continent?

Name four important substances of which North America furnishes nearly or more than half of the world's supply.

When were the western boundaries of the continent discovered? When were the northern boundaries discovered?

Show by the map that it is not correct to say that ships sail "straight south from New York to Buenos Aires."

In what respect does North America resemble in shape all the other great land masses? Which ones does it most closely resemble?

What is the chief difference between the eastern coast of North America and the western?

Is the continent wider or narrower at the line of its greatest breadth than is South America? Make a similar comparison with Africa.

Is it longer or shorter from north to south than is Asia? Europe? South America?

What resemblance is there, broadly speaking, between the relief features of North America and those of Europe?

What does the word *Cordillera* mean? To what is it applied?

How does North America compare in average elevation above sea level with Europe?

How did the rivers and lakes of the continent aid the early explorers?

What is the "Father of Waters," and what distinction has it?

Where are the most important river systems of North America located? Why are the rivers of the northwestern part of the continent of so little importance?

How do the rivers of the Great Basin differ from those of the rest of the continent?

What may be said with reference to the rivers of the tropical part of North America?

Why is it fortunate that the early explorers and settlers of the continent approached it from the east rather than from the west?

Why is the average temperature of the Labrador coast so much lower than that of the corresponding latitude on the Pacific coast?

In what part of the continent would you find moss and lichens as the characteristic vegetation? Where would you find cactus? Mahogany?

What animals, of which there were formerly great herds in North America, are now to be seen only in parks or reserves?

How many nationalities have at various times held large possessions on the continent?

After English, what language constitutes the native tongue of the largest number of people in North America?

The Native Peoples. Most of the people of continental North America are now of European races, and those of the West Indies are of African descent. Only in the southern countries and in the far North are there many survivors of the people who possessed the land before the coming of the white man. Descriptions of them will be found in the articles INDIANS, AMERICAN; ESKIMO.

How Men Have Divided the Continent. When Columbus startled Europe with the announcement of his discovery of lands beyond the Atlantic, Pope Alexander VI proclaimed all heathen countries west of Europe to be Spanish. But the English under John Cabot were the first to find the mainland (for Columbus on his first voyage had visited only the Bahamas, Cuba and Haiti), and, when its Church threw off the authority of Rome, England became nearly as extravagant in its claims as Spain. France, too, entered the contest for territory, and so it came about that America was divided according to the actual achievements of explorers and colonizers and not by the decrees of their sovereigns.

The Spanish, starting from Cuba and Haiti, conquered the southern half of the continent. On the Pacific coast they penetrated nearly to the Columbia River, but on the Atlantic they advanced only a short distance north of the Gulf of Mexico. The French, working from Champlain's settlements at Quebec, established their trading posts in the valleys of the Saint Lawrence and the Mississippi. The English colonized the Atlantic coast from Maine to Georgia and their Hudson's Bay Company was active in the far north. The Dutch gained a temporary foothold at New York, and in the late eighteenth century the Russians pushed forward from Asia into Alaska. To-day the English alone hold any considerable portion of their early empire in America, though the French language is still spoken in the province of Quebec and men of Spanish descent rule almost everywhere south of the United States. By wars, revolutions and sales of territory (the stories of which are told in articles on the individual countries) boundary lines in North America have been shifted back and forth until now the 8,300,000 square miles of this northern half of the New World is divided as the following list shows:

English-Speaking Countries

United States, including Alaska and Panama Canal Zone: area, 3,618,121 square miles; population, about 100,000,000.

Canada: area, 3,729,665 square miles; population, 7,206,643.

British Colonies, including Newfoundland and Labrador, Bahamas, Bermudas, British Honduras, Jamaica and minor West Indian islands: area, 183,551 square miles; population, 2,000,000.

Spanish-Speaking Countries

Mexico: area, 785,881 square miles; population, 15,063,207.

Guatemala: area, 48,290 square miles; population, 2,119,165.

Salvador: area, 7,325 square miles; population, 1,700,000.

Honduras: area, 44,275 square miles; population, 600,000.

Costa Rica: area, 23,000 square miles; population, 400,000.

United States possessions—Porto Rico: area, 3,435 square miles; population, 1,118,012. Danish West Indies (now the Virgin Islands of the United States): area, 138 square miles; population, 32,786.

Under United States protection—Cuba: area, 44,164 square miles; population, 2,383,000. Santo Domingo: area, 18,045 square miles; population, 700,000. Nicaragua: area, 49,200 square miles; population, 500,000. Panama: area, 32,380 square miles; population, 427,000.

French-Speaking Countries

French Colonies—Saint Pierre and Miquelon, Guadeloupe: area, 1,166 square miles; population, 411,000.

Under United States protection—Haiti: area, 10,204 square miles; population, 2,000,000.

Danish-Speaking Countries

Greenland: area, 826,000 square miles; population, 13,500.

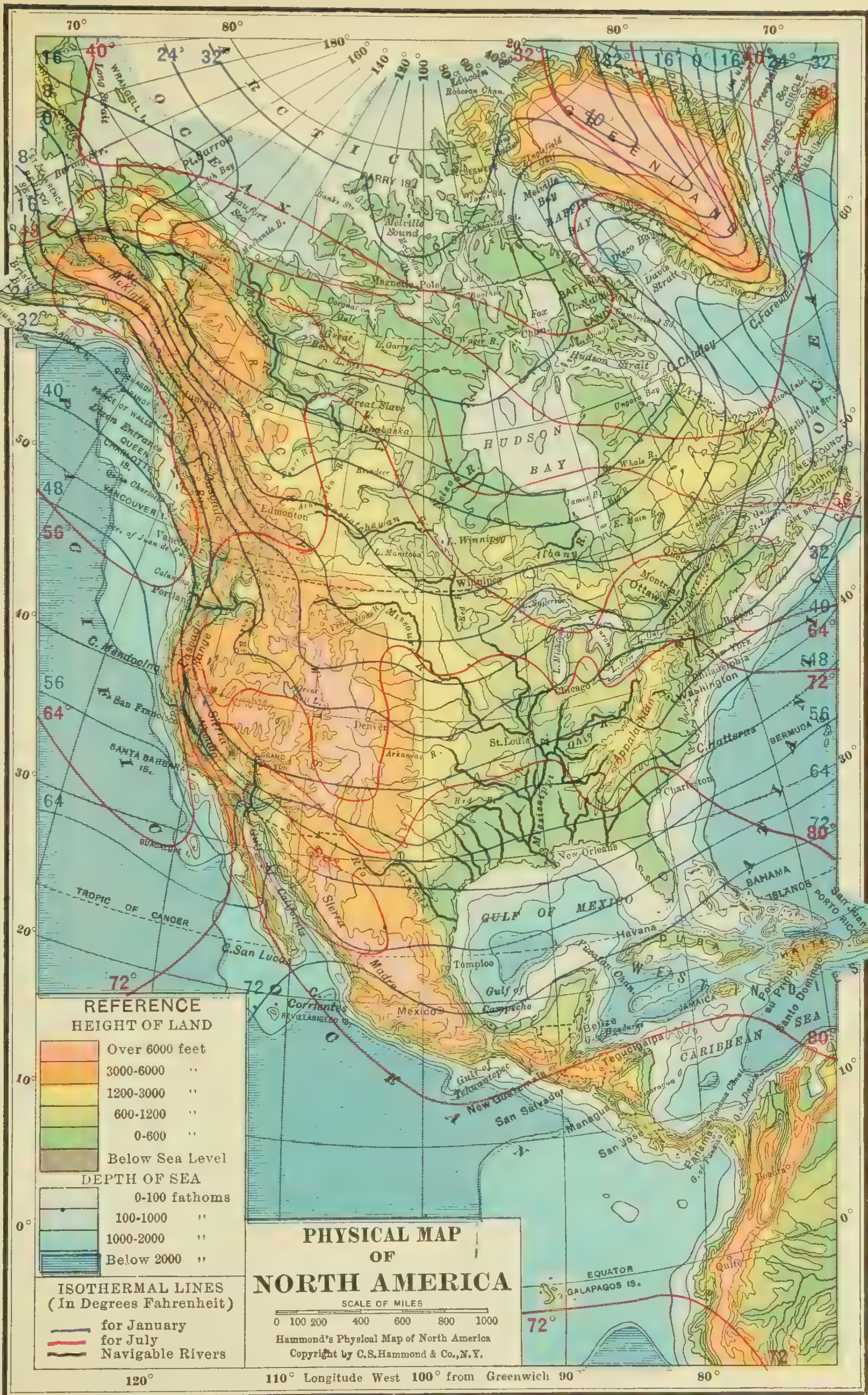
History. For the history of North America see the appropriate subtitles under CANADA; UNITED STATES; MEXICO, etc. C.H.H.

Consult Dawson's *North America;* Sanford's *Compendium of Modern Geography and Travel;* Carpenter's *Geographical Reader: North America;* Herbertson's *North America.*

Related Subjects. It will be impossible to list here all the articles which deal with the geography and life of North America, but these are listed elsewhere. The cities and towns, the history, the products, for instance, are indexed under the articles on the various countries. The more general topics are here listed and classified:

COAST WATERS

Arctic Lands and Seas
Atlantic Ocean
Baffin Land and Baffin Bay
Belle Isle, Strait of
Bering Sea
California, Gulf of
Caribbean Sea
Chesapeake Bay
Delaware Bay
Florida, Gulf of
Fundy, Bay of
Hudson Bay
James Bay
Juan de Fuca, Strait of
Long Island, subhead Long Island Sound
Mexico, Gulf of
Minas Bay
Narragansett Bay
Pacific Ocean
Puget Sound
Saint Lawrence, Gulf of



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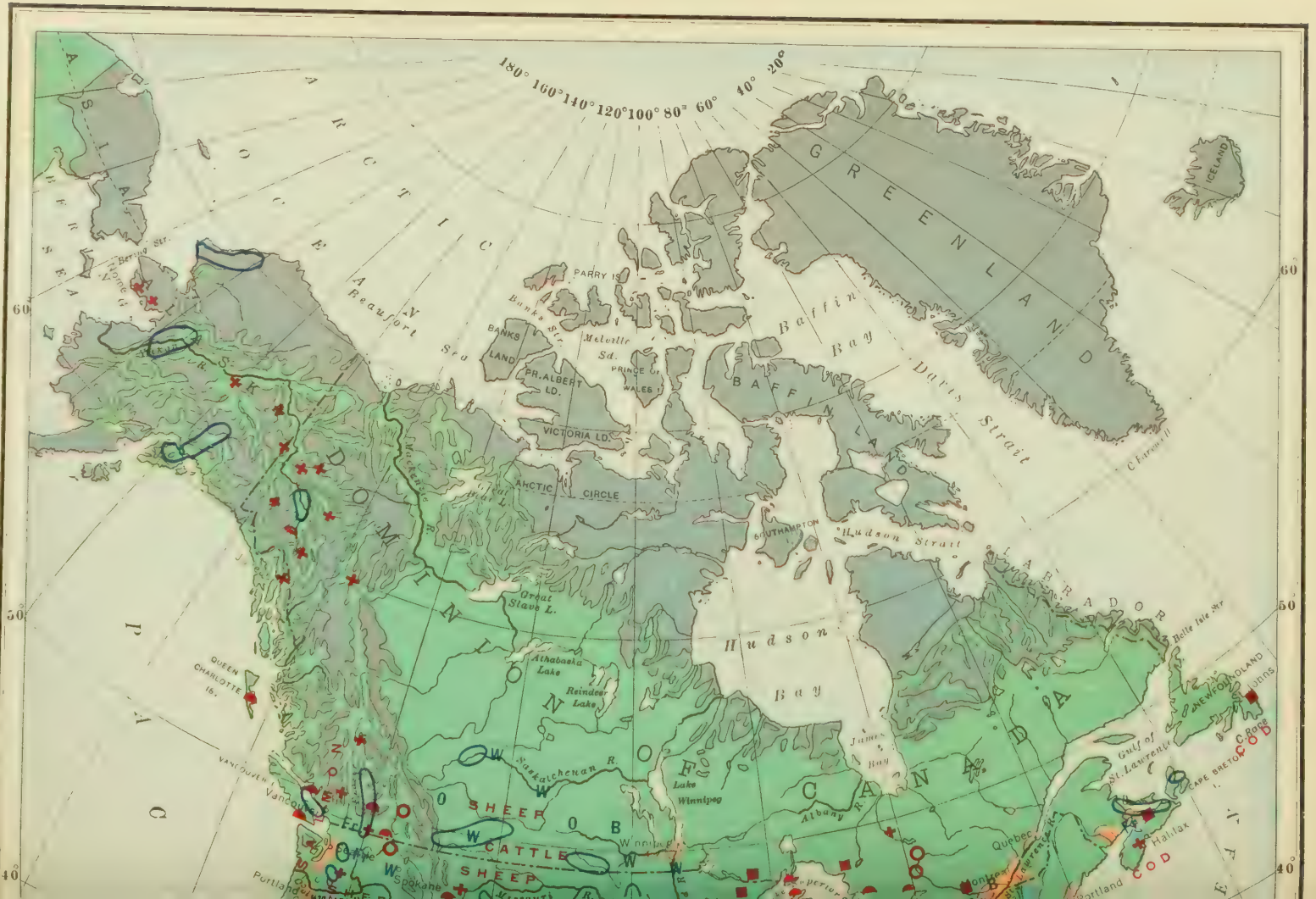

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Nome
Beaufort Sea
Banks Str.
Melville Sd.
PARRY IS.
BANKS LAND
PR. ALBERT LD.
PRINCE OF WALES I.
VICTORIA LD.
ARCTIC CIRCLE
GREENLAND
ICELAND
Baffin Bay
Davis Strait
BAFFIN LAND
SOUTHAMPTON I.
Hudson Strait
LABRADOR
Belle Isle Str.
NEWFOUNDLAND
St. Johns
C. Race
COD
CAPE BRETON I.
Halifax
Gulf of St. Lawrence
Hudson Bay
James Bay
Albany R.
Lake Winnipeg
Great Slave L.
Athabaska Lake
Reindeer Lake
Saskatchewan R.
Mackenzie R.
DOMINION OF CANADA
QUEEN CHARLOTTE IS.
VANCOUVER I.
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Spokane
Portland
SHEEP
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SHEEP
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Portland
PACIFIC
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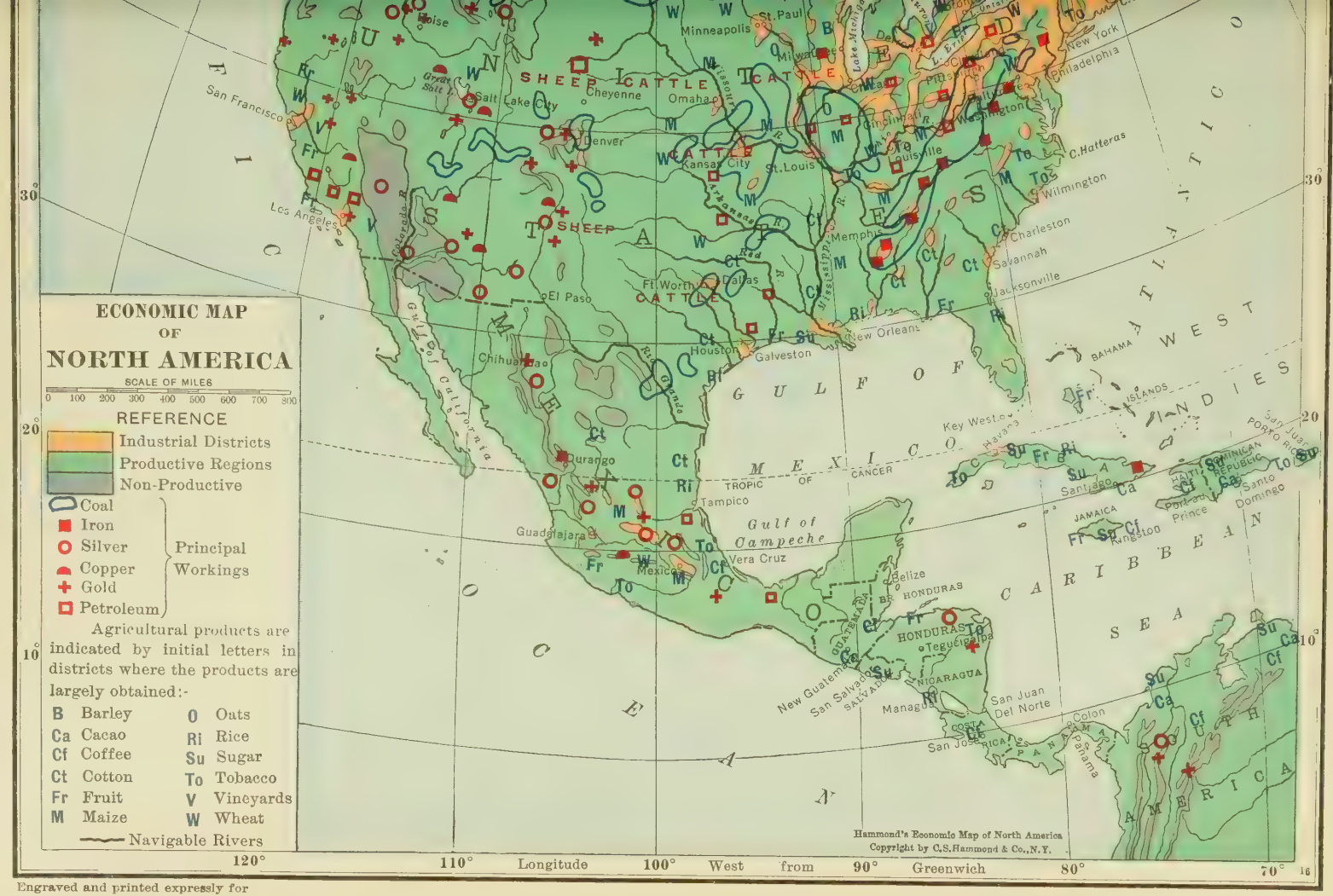

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Reindeer Lake
Saskatchewan R.
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Fraser R.
Vancouver I.
Vancouver
Seattle
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Juneau
DOMINION OF CANADA
Hudson Bay
James Bay
Albany R.
SOUTHAMPTON I.
Hudson Strait
BAFFIN LAND
Baffin Bay
Davis Strait
C. Farewell
GREENLAND
ICELAND
LABRADOR
Belle Isle Str.
NEWFOUNDLAND
St. John's
C. Race
Gulf of St. Lawrence
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Quebec
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Vancouver
Seattle
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PACIFIC
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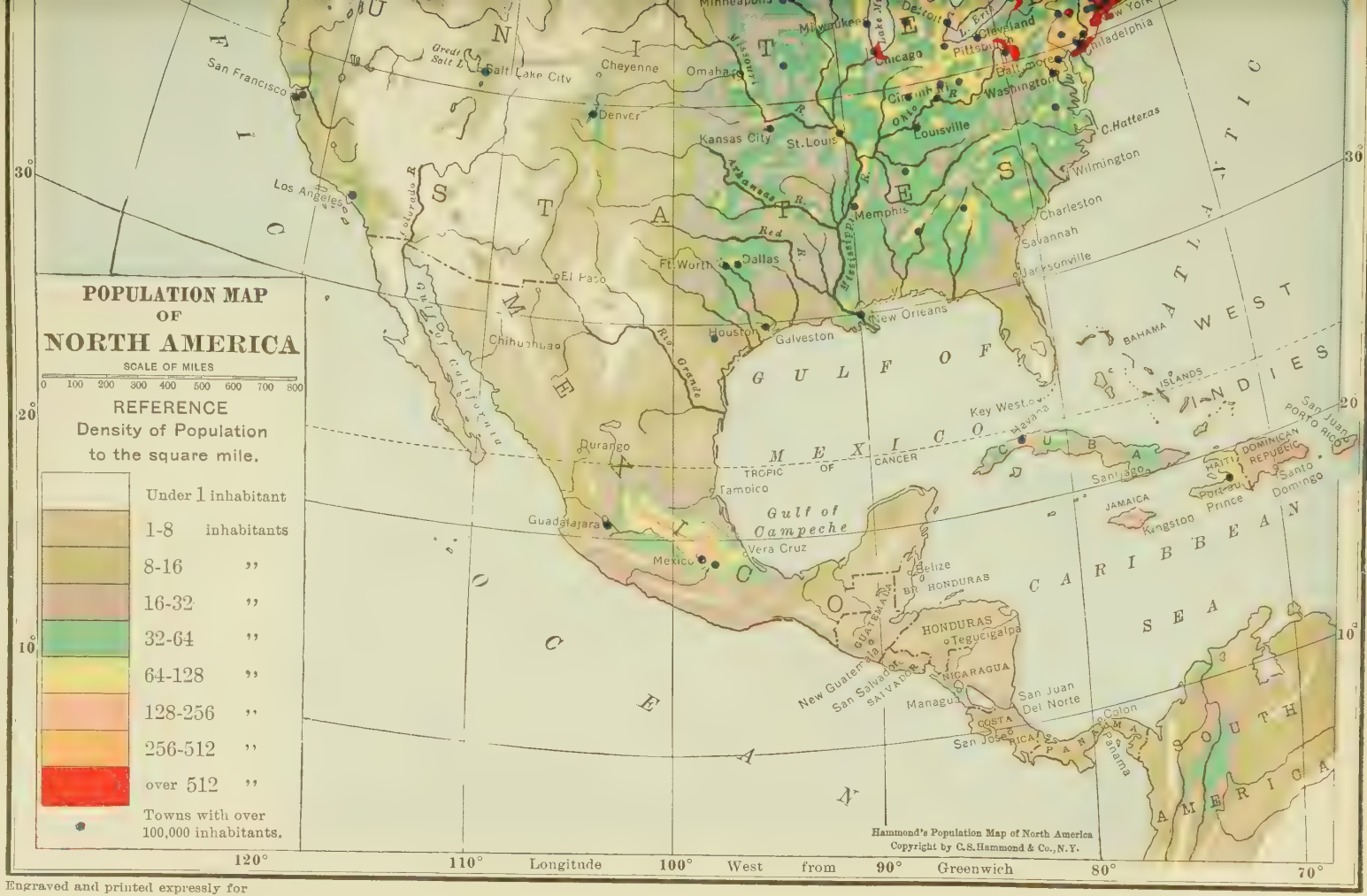

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LAKES

Athabaska, subhead
Athabaska Lake
Bras d'Or
Cayuga
Champlain
Erie
George
Great Bear
Great Lakes, The
Great Salt Lake
Great Slave
Huron
Lake of the Woods
Louise
Manitoba
Memphremagog
Michigan
Moosehead
Muskoka
Nicaragua
Nipigon
Nipissing
Okechobee
Oneida
Ontario
Pontchartrain
Rainy Lake
Saint Clair
Salton Sea
Seneca
Simcoe
Superior
Tahoe
Utah
Winnipeg

MOUNTAINS

Adirondack
Alleghany
Appalachian
Assiniboine, Mount
Berkshire Hills
Black Hills
Black
Blue Ridge
Cascade Range
Catskill
Coast Range
Columbia
Cordillera
Cumberland
Green
Holyoke, Mount
Hood, Mount
Hooker, Mount
Iron Mountain
Katahdin
Laurentian Plateau
Logan, Mount
McKinley, Mount
Ozark
Pike's Peak
Popocatepetl
Ranier, Mount
Rocky
Saint Elias
Selkirk
Shasta, Mount
Sierra Madre
Sierra Nevadas
Stone Mountain
Taconic
Uinta
Wasatch
White
Whitney, Mount

POLITICAL DIVISIONS

Alaska
British Honduras
Canada
Costa Rica
Guatemala
Honduras
Mexico
Newfoundland
Nicaragua
Salvador
United States

RIVERS

Alabama
Albany
Allegheny
Apalachicola
Arkansas
Assiniboine
Atchafalaya
Athabaska, subhead
Athabaska River
Bighorn
Brazos
Canadian
Chattahoochee
Chaudière
Chickahominy
Churchill
Colorado
Columbia
Connecticut
Coosa
Cumberland
Delaware
Detroit
East
Fraser
Genesee
Gila
Great Kanawha
Green
Hamilton
Housatonic
Hudson
Humboldt
Illinois
James
Kansas
Kennebec
Kentucky
Kootenay River and District
Lackawanna
Lehigh
Mackenzie
Merrimac
Minnesota
Miramichi
Mississippi
Missouri
Mobile
Mohawk
Monongahela
Montgomery
Moose
Nelson
Niagara Falls and River
Ohio
Ottawa
Peace
Pecos
Penobscot
Platte
Potomac
Rappahannock
Raritan
Red
Red River of the North
Restigouche
Rio Grande
Roanoke
Rock
Sabine
Saco
Sacramento
Saguenay
Saint John
Saint Lawrence
Saint Mary's
San Joaquin
Saskatchewan
Savannah
Schuylkill
Scioto
Shenandoah
Skeena
Snake
Stikine
Susquehanna
Tennessee
Tombigbee
Wabash
Washita
White
Willamette
Wisconsin
Yazoo
Yellowstone
Yukon

NORTHAMPTON, *north amp'ton,* unrivaled in England for the manufacture of boots and shoes, is the capital of Northamptonshire. It is situated on rising ground on the left bank of the River Nene, on a branch canal connecting it with the Grand Junction Canal, sixty-five miles northwest from London. The city is very busy and enterprising. Considerable trade is carried on in various kinds of leather, and there are large iron and brass foundries, breweries and flour mills. The town hall, the corn exchange, the museum and schools of science and art are among the newer fine buildings. Of the thirteen churches, the most interesting are Saint Peter's and Saint Sepulchre's, the latter being one of the few remaining round churches of England. Population in 1921, 90,923.

NORTHAMPTON, Mass., the county seat of Hampshire County, situated in the west-central part of the state, eighteen miles north of Springfield and 105 miles west of Boston. It is served by the Boston & Maine and the New York, New Haven & Hartford railroads and by electric interurban lines. The population in 1910 was 19,431; the Federal census of 1920 reported 21,951. The city, which includes several villages, covers an area of thirty square miles, and is beautifully situated along the Connecticut River. It is one of New England's most attractive towns, with wide streets, arching elms and pleasant homes, and is becoming a favorite summer resort. From the summits of Mount Tom and Mount Holyoke, easily reached, are splendid views of the river and valley.

Northampton is well known as the seat of Smith College (which see), one of the principal American colleges for women. Other important institutions include an agricultural school, established in 1906, the Mary A. Burnham School for Girls, the Miss Capen School for Girls (preparatory), the Academy of Music, the People's Institute, Smith Charities, a home for aged and invalid women, Cooley Dickinson Hospital, the Clarke Institute for Deaf Mutes and the state insane asylum. In addition to the college library, the city has the Forbes and Clarke public libraries. Among the prominent buildings are Carnegie Hall, the Federal building, erected at a cost of $70,000, the courthouse, Y. M. C. A. building, high school building, state armory and a profitable municipally-owned theater.

The most important agricultural products of the surrounding country are tobacco, potatoes, onions, corn and fruit. The manufactures of the city include silk hosiery, dress silks, silk braids and thread, baskets, brushes, cutlery, hydrants and filters. Northampton was settled by English colonists from Springfield in 1674 and was incorporated the same year. It became a city in 1884. Jonathan Edwards was a pastor here from 1729 until 1750. J.J.K.

NORTH ATTLEBORO, *at''l bo ro,* MASS., a town of Bristol County in the southeastern part of the state, thirty-three miles southwest of Boston and twelve miles northeast of Providence. It is on the New York, New Haven & Hartford Railroad and on electric interurban lines. The area of the town, which includes several smaller villages, is nineteen square miles. In 1920 the population was 9,238, a slight decrease since 1910.

North Attleboro's most important industry is the manufacture of jewelry and jewelers' supplies. More than seventy establishments, employing 2,800 men, have an annual output valued at nearly $5,000,000. There are also manufactories of cotton yarn, silverware and rope. The more prominent buildings of the town include the Federal building, erected in 1916 at a cost of $70,000, Richards Memorial Library, Elks' Home and several attractive churches. In the town and vicinity are places of historical interest. The first settlement was made in 1637; it was incorporated as a town in 1887. C.A.H.

NORTH BAT'TLEFORD, a town in the west-central part of Saskatchewan. It is situated on the north bank of the Saskatchewan River at its junction with the Battle River; on the south bank is the town of Battleford (which see). The main line of the Canadian Northern Railway passes through the town, which is 573 miles northwest of Winnipeg, 254 miles southeast of Edmonton. A branch runs to Prince Albert, 131 miles northeast, and a second branch is under construction to Athabaska. At Battleford there is connection with the Grand Trunk with 2,072 in 1901; in 1921, by Dominion census, 10,692.

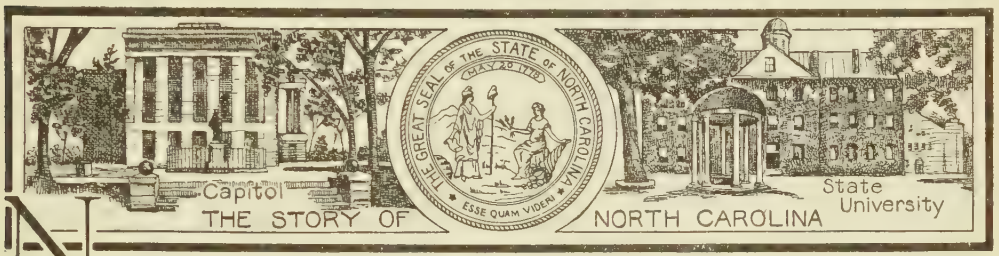
Tributary to North Battleford is a large section which raises chiefly wheat and oats. Some of the wheat sent to the town is made into flour at the local mill, and the remainder is shipped to distant markets. The manufactures of the town include cement blocks and sills, bricks, biscuits and butter. The markets, electric light and power plant, and the water and sewerage systems are owned and operated by the municipality. Among the most noteworthy buildings in North Battleford are the armory, the hospital, the $50,000 government building, and the collegiate institute, which cost $150,000.

NORTH BAY, a town in Ontario, the county town of Nipissing County. It is situated at the eastern end of Lake Nipissing, and is on the Grand Trunk, Canadian Pacific, Canadian Northern and Timiskaming & Northern Ontario railways. The Canadian Pacific has divisional repair shops here. North Bay is the center of a prosperous lumbering district, and is the gateway to the Cobalt and Porcupine mining districts. It is also noted as a resort for tourists and sportsmen, the fishing and hunting near by being excellent. In addition to the railway shops, North Bay has a smelter, foundry, brick plant, several large saw and planing mills and other industrial establishments. It has a high school and a provincial normal school besides the public and separate schools. The waterworks system is owned and operated by the town. Population in 1911, 7,737, compared Pacific. Population in 1911, 2,105; in 1921, 4,108.

NORTH BRADDOCK, *brad'ok,* PA., a borough in Allegheny County in the southwestern part of the state, situated two miles east of Homestead and ten miles southeast of Pittsburgh, on the Pennsylvania Railroad. The people are chiefly engaged in making steel rails, one of the large plants of the United States Steel Corporation being located here. The borough was a part of Braddock township until 1897, when it was incorporated separately. In 1910 the population was 11,824; by 1916 it had increased to 15,148 (Federal estimate).

NORTH'BRIDGE, Mass., a town in Worcester County, situated southeast of the geographical center of the state, about twelve miles southeast of the city of Worcester, where the Blackstone and Mumford rivers meet. The New York, New Haven & Hartford Railway serves the town, and electric lines connect with cities and towns north and south. Northbridge has big machine shops, cotton, woolen and paper mills and cigar factories. Its waterworks are owned and operated by one of the machine-manufacturing plants. The town also has a library and a hospital. It was settled in 1662, but was a part of Mendon until it was incorporated as a separate town in 1772. Several villages unite to form the town of Northbridge, which in 1910 had a population of 8,807; in 1920 it was 10,074, a gain of 15 per cent. The area is about fifteen square miles.

NORTH CAPE, a desolate, rocky headland rising abruptly to a height of 1,000 feet above the sea. It is located far to the north on the island of Magerö, which lies in the Arctic Ocean near the north coast of Norway. In the summer North Cape attracts many visitors who come there to view the "midnight sun." Next to the neighboring island of Knivskjaerodden, it is the most northerly point of Europe. The northernmost point of the mainland is 44 miles east. See Norway.



NORTH CAROLINA, popularly known as the Old North State or Tar Heel State, one of the original thirteen states of the American Union, belonging to the South Atlantic group. This state possesses striking contrasts of surface, rising from extensive swamps along the coast to the loftiest mountains east of the Rockies.

Size and Location. Lying between Virginia and South Carolina on the Atlantic coast, North Carolina covers an area of 52,426 square miles, and ranks twenty-seventh in size among the states. Its gross area is about equal to that of the state of Alabama, and includes large lagoons and sounds, enclosed by long, narrow, barrier beaches; this water area, with the rivers and a few unimportant lakes, covers 3,686 square miles.

The People. Although the greater part of the population of North Carolina is rural, the average number of inhabitants per square mile (52.5) is high, and the population of the state is almost equal to that of California, which is about three times its size. In 1920, with 2,559,123 inhabitants, it ranked fourteenth in population among the states of the Union. The reported population January 1, 1910, was 2,206,287. Over 763,000 of the people are negroes. The Indians, numbering 11,824, are Cherokees, occupying the Qualla Reservation, and Croatans, a mixed breed, living in Robeson County. There are comparatively few foreigners in the state.

Until the end of the nineteenth century, when manufacturing industries began to be important, Wilmington was the only town in North Carolina with a population of 15,000. There are now seven cities in the state with over 15,000, the largest of which is Charlotte. Others are Winston-Salem, Wilmington, Raleigh, the capital, Asheville, Durham and Greensboro. Each is described in these volumes.

About one-half of all church members are Baptists and nearly one-third are Methodists. Other prominent denominations are the Presbyterians, Lutherans, Disciples of Christ, Episcopalians, Congregationalists, and Roman Catholics.

Education. In common with other Southern states, North Carolina has had the problems of administering an educational system in widely scattered rural communities and among a large population of negroes, but it has long held an advanced position in educational matters among the states of the South. The present system, established in 1839, was based on the ideas of Archibald De Bow Murphy, an educator far in advance of his time. Another name notable in the development of North Carolina's schools is that of Calvin Henderson Wiley, a promi-

nent author, who kept the schools in session during the War of Secession, and for his wise reforms was called the "Horace Mann of the South."

The system is administered by a state board of education consisting of the superintendent of public instruction, the governor, lieutenant-governor, secretary of state, treasurer, auditor and attorney-general. County schools are directed by county superintendents and local committees. Although the illiteracy is high, averaging 18.5 per cent, it is exceeded in seven of the Southern and South-Central states. A compulsory education law has been passed, and in 1914 about two-thirds of the school population were enroled in schools. High standards are encouraged by a state appropriation of $2,500 or less for instruction in industrial arts and farm life, to be given to county schools meeting certain requirements. In 1914 there were fifteen farm-life schools in twelve counties.

Separate schools are maintained for negroes and Croatan Indians. The state maintains normal schools for white teachers at Greensboro and Greenville, and for the colored at Elizabeth City, Fayetteville and Winston-Salem; also the College of Agriculture and Mechanical Arts at West Raleigh. Other well-known institutions of higher education are: the University of North Carolina at Chapel Hill; Davidson College at Davidson; Trinity College at Durham; Elon College at Elon; Guilford College at Guilford; Lenoir College at Hickory; Catawba College at Newton; Meredith College at Raleigh; Wake Forest College at Wake Forest; Saint Mary's College at Belmont. Prominent among the woman's colleges are: Elizabeth College at Charlotte; Greensboro Female College at Greensboro, and Presbyterian colleges at Red Springs and Charlotte. Institutions for the negroes are: Biddle University at Charlotte; Shaw University at Raleigh; Livingston College at Salisbury.

North Carolina was one of the pioneer states of the South in the systematic care of defective and dependent classes. A board of charities controls charitable and correctional institutions, including hospitals at Morgantown, Raleigh and Goldsboro; an institution for the feeble-minded at Kingston; a tuberculosis sanitarium at Aberdeen; a school for the white deaf at Morganton; institutions for the white blind and colored blind and deaf, a soldiers' home and the state prison at Raleigh; a colored orphanage at Oxford; a training school at Concord. There are many private homes and hospitals under the indirect control of the board, which are legally a part of the system of public charities.

The Land. The state includes the three well-marked surface divisions of Eastern United States—the coastal plain occupying the eastern half of the state, the Piedmont plateau in the central section, and the Appalachian system in the west.

The coastal plain, or "low country," 100 to 150 miles in width, rises gradually from the coast lagoons and swamps of moss-hung cedar and cypress, to level, sandy pine barrens. The most extensive tract of swamp land is the Dismal Swamp, lying partly in Virginia. Along the streams there are forests of gum trees, and south of the Cape Fear River there are luxuriant groves of palmettos, magnolias, the mock orange and American olive. A narrow barrier of sand beaches stretches 325 miles along the entire coast, enclosing Albemarle and Pamlico sounds and smaller, tideless lagoons and bays. The bar projects in prominent points at Cape Hatteras, Cape Lookout and Cape Fear, which are bordered by dangerous shoals and washed by treacherous currents.

The Piedmont plateau, popularly called the "up country," rising abruptly 200 feet above the coastal plain and extending to the Blue Ridge Mountains, is at its greatest width in North Carolina. Its undulating fields merge into bold and rugged hills near its western extremity. It is the most thickly settled and most highly cultivated and developed region of the state.

The Blue Ridge Mountains, marking the eastern boundary of the Appalachian region, rise precipitously above the Piedmont plateau, reaching an altitude of 4,000 feet in the north. These mountains are densely forested to their domelike summits. West of this range, in the Black Mountains and the Great Smoky Mountains of the Unaka Range, the cliffs are steep and the peaks pointed and bare. The lower slopes are heavily wooded and covered with a luxuriant undergrowth of mosses, ferns, rhododendrons, magnolias and azaleas of rare beauty. There are many beautiful waterfalls in the mountain ravines, and swift streams thread the narrow, deep valleys. The Unaka Range, Black Mountains and Blue Ridge Mountains constitute the largest and highest mountain masses of Eastern United States. The loftiest peak east of the Rockies is Mount Mitchell, which rises 6,711 feet in the Black Mountains. Other noteworthy peaks are Black Brother and Hairy

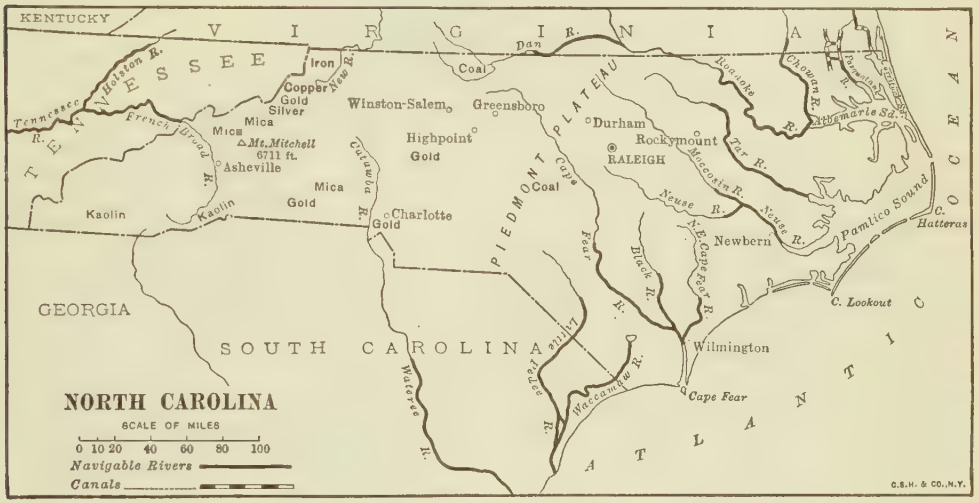
Bear mountains, both having an elevation of over 6,650 feet. The beautiful scenery, high altitude and healthful climate have made the Carolina mountains a famous resort during both summer and winter seasons.

Rivers and Lakes. Nearly all of the coastal plain rivers rise in the Blue Ridge Mountains and have a general southeast course, entering the sea through wide-mouthed harbors. The Roanoke, Chowan, Tar and Neuse, draining the northern section, enter Albemarle and Pamlico sounds. The Cape Fear, Black and N. E. Cape Fear rivers drain the southeastern part of the state. All of these rivers become sluggish near the sea, and many are navigable as far as the Piedmont plateau, where at the "fall line" there are cataracts and rapids. In the Piedmont plateau they are swift and furnish a great amount of water power, perhaps unequaled in any of the Atlantic states but Maine. The region west of the Blue Ridge Mountains is drained into the Mississippi basin by the headwaters of the Tennessee, the largest rivers being the Little Tennessee, French Broad, Wautauga, New and Hiwassee rivers.

The only lakes are in the coastal plain and they are chiefly small, shallow bodies of water surrounded by swamps. The largest is Lake Mattamuskeet, draining into Pamlico Sound.

Climate. North Carolina has all varieties of climate, ranging from the subtropical summers of the southeast section to the subarctic winters in the lofty mountain regions. However, in the central part of the state and on the lower mountain slopes the climate is temperate and equable. The temperature on the coast averages 77° in summer and 45° in winter, and is 5° higher than the mean temperature in the mountains. The average snowfall is five inches, but snow rarely lies on the ground more than one or two days except in the mountains. Rainfall is abundant and fairly evenly distributed, the annual precipitation being 53.3 inches. Subtropical storms, especially severe off Cape Hatteras, often sweep the entire coast, endangering navigation.

Agriculture. Owing to its great variety of climate and surface, North Carolina is unrivaled by any of the Eastern states in the variety of its vegetation, and probably is surpassed by no region of equal area in the world. Over two-thirds of the area of the state is in farm lands, more than half of which are improved. The best farms are in the uplands of the Piedmont plateau, where hay, Indian corn, wheat, vegetables, grapes and orchard fruits are extensively raised. Cotton, the most important crop, is chiefly cultivated in the southern part of this section and near the west border of the coastal plain, and tobacco is grown in great quantities in the north. In the coastal plain, sorghum cane is grown in the southeast, a small amount of rice is cultivated along the rivers, vegetables are raised in the central and southern counties, and large crops of peanuts are produced in the north.

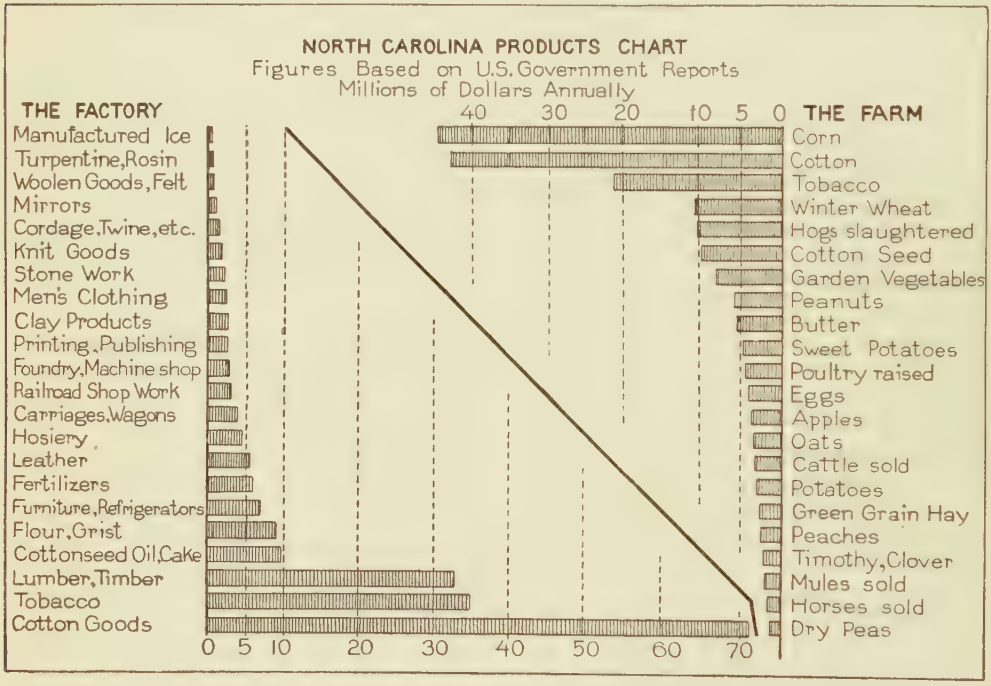


OUTLINE MAP OF NORTH CAROLINA

Showing boundaries, navigable rivers, principal cities, mineral locations and the highest point of land in the state.

The leading crops are cotton and Indian corn, followed by tobacco. Till 1911 cotton culture steadily increased, due to the development of cotton manufacturing in the South, and the increased use of cottonseed oil. Although in 1914 and 1915 the exportation of cotton was greatly decreased by the War of the Nations, causing a grave situation in the cotton-producing states; the increased use of cotton in the manufacture of explosives and munitions in 1915 and 1916, and the greater attention given to other crops, relieved the situation, and the state prospered as never before.

timber. The chief commercial trees are the yellow pine and the oak and chestnut. Over eighty per cent of the timber cut in the state is yellow pine, which ranks first among the soft woods used in the United States. From these pines, also, large quantities of pitch, tar, rosin and turpentine are produced. North Carolina and Maryland were the first Southern states to have state forest departments. Large districts of forest land on Mount Mitchell and in the western counties have been approved by the United States Bureau of Forestry, and are to be added to the National forests. The govern-



In 1915 North Carolina ranked second among the states in the production of tobacco, a place which it has held in most of the years since 1894, Kentucky ranking first. In the same year the state was exceeded by none in the output of sweet potatoes; occasionally Georgia's crop is greater. It held seventh place in the production of cotton, and in 1914 ranked seventeenth among the states in the total value of crops. The pasturage of live stock has declined with the increased cultivation of market produce in the Piedmont plateau. Dairy farming is carried on in the upland districts and mountain valleys.

Forests. North Carolina is one of the leading states in the production of lumber and

ment coöperates with the state in forest fire protection.

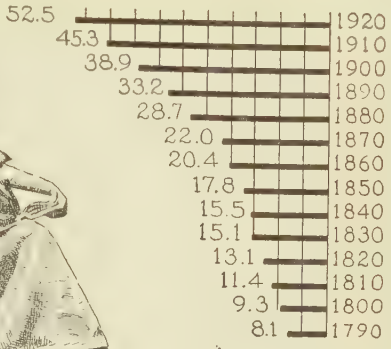
Fisheries. In the coast waters, the sounds and wide estuaries, fishing is an important industry. In 1908 North Carolina ranked eleventh among the states in the value of fisheries. Shad, oysters and herring are the most important fish products, and alewives, mullet, clams, bass and bluefish are caught in large quantities. The state is making a special study of the shad and terrapin fisheries and oyster culture. There is little deep-sea fishing, most of the catch being made along the shore or in the sheltered waters of the sounds and bays.

Mines. There are many varieties of minerals in North Carolina, but few are found in quan-

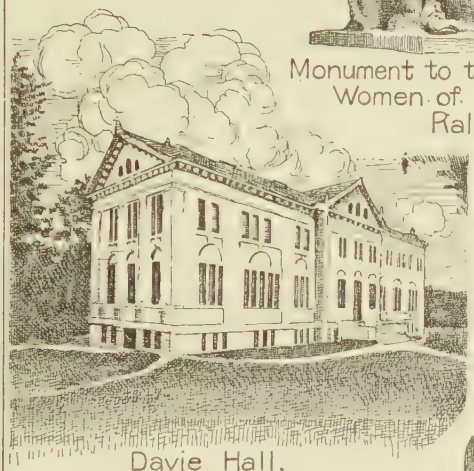
NORTH CAROLINA

Religions

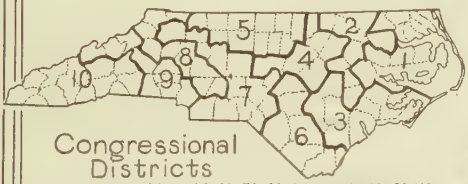
Monument to the North Carolina Women of the Confederacy, Raleigh



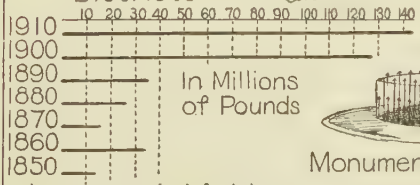
Increase in Population Per Square Mile By Decades


Davie Hall, University of North Carolina

Administration Building, Raleigh

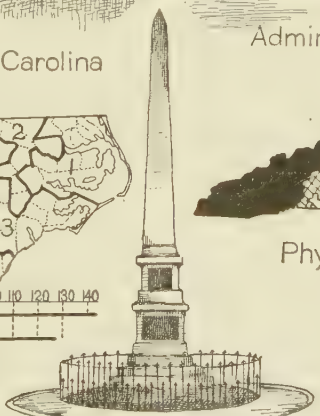


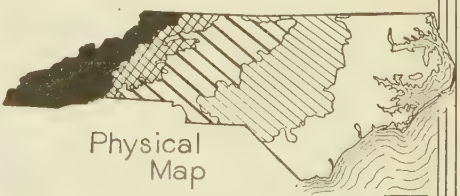
Congressional Districts



In Millions of Pounds

Increase in Yield of Tobacco in Six Decades


Monument to the Signers of the "Mecklenburg Declaration of Independence"


Physical Map

tities of commercial importance. Nearly one-half of the total income from minerals is the value of clay products, and the state produces half of the kaolin in the United States. Next in importance is the quarrying of stone. White granite of a fine quality and excellent varieties of marble are taken from the western mountains. In the output of mica, North Carolina ranks first among the states and produces white mica of the best grade for glazing, and of as fine a quality as is found anywhere in the world. The mining of corundum was very important until the discovery of larger deposits in Canada; none is now produced anywhere in the United States.

During the first half of the nineteenth century, before the discovery of gold in California, North Carolina was one of the leading states in the production of gold. Before the War of Secession this metal was produced in such quantities that a branch mint was established at Charlotte. North Carolina still ranks first among the Eastern states in gold production, but is comparatively unimportant in respect to the total output of the United States. Magnetite ore is mined in Avery County, talc is widely distributed, and zircon and monazite, used in the manufacture of incandescent lights, were formerly produced. Copper, lead, feldspar, quartz, soapstone, sand, gravel, mineral waters and gems, including rubies, opals and agates, are found. The value of the mineral product in 1920 was $2,744,583.

Manufacture. The more extensive use of the great available water power of the Piedmont rivers and mountain streams, navigable waterways and improved railroad transportation have placed North Carolina among the leading manufacturing states of the South. The principal industry is the manufacture of cotton goods. In 1910 North Carolina, being surpassed by Massachusetts, ranked second among the states in the number of producing spindles. The manufacture of tobacco is next in importance, followed by lumber and timber products, including rough lumber, materials for interior finishing, furniture, and tar, rosin and turpentine. Other important industries are the manufacture of flour, cottonseed products, fertilizers and knit goods and the curing and tanning of leather. Durham and Winston-Salem are the most important manufacturing cities. In 1920 North Carolina ranked fifteenth among the states in manufacturing, producing goods valued at $943,808,000, at that year's high prices.

Transportation. In 1915 there were 286 miles of electric railway and over 5,400 miles of steam railroad in the state, the chief roads being the Southern, the Atlantic Coast Line, the Norfolk Southern and the Seaboard Air Line. The coast waters and large rivers of the coastal plain are navigable. Communication between Albemarle Sound and Chesapeake Bay is afforded by the Dismal Swamp Canal. Wilmington is the commercial center and has steamship lines to New York, Philadelphia and Baltimore. The chief exports are tar, turpentine, rosin, lumber, cotton, tobacco, flour and fish. There are two customs districts, Wilmington and Pamlico. In 1915 a state highway department was created, and an annual appropriation of $10,000 is made for the improvement of roads.

Government and History

Government. The present constitution, adopted in 1876, is the fourth constitution of the state, and it has been revised and amended in 1879, 1888 and 1900. A constitutional convention may be called when approved by two-thirds of both houses of the legislature and by a majority of voters. Amendments must be accepted by three-fifths of each house and a majority of voters before becoming part of the state constitution. Suffrage is restricted to male citizens residing in the state two years, who are able to read and write the constitution in English, and who have not been convicted of crime. A state board of elections appointed by the governor has charge of elections. In 1915 a primary election law was passed requiring state officers, representatives in the national Congress, district officers and members of the state legislature to be nominated in primaries. Atheists are not permitted to hold office.

The *legislative power* is vested in a general assembly consisting of a senate of fifty members and a house of representatives of 120 members, elected and meeting biennially.

The *executive* power is vested in a governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction and attorney-general. The governor's power is greatly limited by an administrative council consisting of the secretary of state, auditor, treasurer and superintendent of public instruction. He has no veto and very little appointive power, and neither he nor the lieutenant-governor may serve two successive terms.

RESEARCH QUESTIONS ON NORTH CAROLINA

(An Outline suitable for North Carolina will be found with the article "State.")

Where is "Little Hell," and why is it so called?

From what point can you see seven states? From a map of the United States decide what states these are.

What is a "fall line," and what effect does it usually have on the industry of the state in which it occurs?

What cities in North Carolina are situated on the fall line? (See map on page 2134.)

Where may "iron trees" be found?

Give the popular names of this state. What industry accounts for one of them?

Upon how many states does North Carolina border? (See map of United States.) From how many is it separated by natural boundaries, as rivers or mountains?

How many states are smaller? How many of these smaller states have a larger population? (See tables in article UNITED STATES.)

How did the opening up of one of the Pacific coast states affect an important industry of this Atlantic coast state?

What is the railroad mileage of this state to each hundred square miles of area? How does it compare in this respect with the states on which it borders?

How does the density of population in North Carolina compare with that of the country as a whole?

How does it compare with that of the state nearest it in area? With that of the state nearest it in number of inhabitants?

How has the growth of industries affected the number and size of cities?

At the outbreak of the Revolutionary War, what territory did the state possess which it does not own now?

What distinction has North Carolina's loftiest point?

What was the *Ku-Klux Klan* (see article in these volumes)?

Who was called the "Horace Mann of the South," and why?

What does the state do to help the farmer?

Why is North Carolina's great swamp area not so serious a drawback as are most swamp areas elsewhere?

How are the sounds on the coast formed?

How much difference is there between the average winter temperature and the average summer temperature of the coast region?

What effect did the outbreak of the War of the Nations have on this state, and how was the difficulty met?

What industry ceased with the opening up of certain mines in Canada?

How has the state dealt with the prohibition question?

What famous man had to do with the first settlement within this territory?

When did the territory of Carolina extend from Atlantic to Pacific?

What did a famous English philosopher have to do with the early government of this colony?

How did the colony show its great interest in independence?

What color is the water in the Dismal Swamp? Why?

About how many Indians are there in the state?

Does North Carolina rank higher among the states as regards its agriculture or its manufacturing industries?

This curtailment of the power of the governor is a surviving trace of the early colonial laws when the colonists thought it necessary to limit the powers of the proprietary and royal governors lest they should establish themselves as absolute rulers.

The *judiciary department* consists of a supreme court having one chief justice and four associate judges elected for eight years, superior courts, district courts, justices of the peace and such inferior courts as are established by law. The state is divided into twenty judicial districts, each having one judge elected for eight years.

There is state-wide prohibition, and the manufacture as well as sale of liquor is illegal. A child-labor law prohibits the employment of children under twelve years of age in factories, and those under sixteen years of age between 9 P. M. and 6 A. M.

Colonization and Early Government. North Carolina was first explored by expeditions sent out by Sir Walter Raleigh, and a settlement was made as early as 1585 under a charter granted to him. Permanent colonization was begun in 1630 by settlers from Virginia. The territory including the present states of North Carolina and South Carolina and most of Georgia was granted by Charles I to Sir Robert Heath, as "Carolina." In 1663 Charles II, extending this territory to the Pacific Ocean, granted it to eight favorites whom he made lord proprietors of the colony. They attempted to establish the "Fundamental Constitution," an unsuitable and elaborate scheme of government devised by the famous philosopher, John Locke. This government was wholly abandoned in 1693. In 1711 the Tuscarora Indians massacred many of the colonists, and they were suppressed only when aid was received from Virginia. In 1728 seven of the proprietors sold their shares to the Crown. North Carolina and South Carolina were then separated and were governed as royal provinces. Many Scotch settled along the upper Cape Fear River, and the Scotch-Irish from Pennsylvania settled in the western part of the colony.

North Carolina was conspicuous in the prerevolutionary discussion. In 1774 the first provincial Congress was called in defiance of the royal governor, and delegates were sent to the Continental Congress. It was the first colony to authorize its delegates to vote for independence, and on December 18, 1776, a state constitution was adopted. North Carolina furnished troops for the Continental armies, and in 1780-1781 was invaded by the British. The state refused to ratify the Federal Constitution until ten amendments had been added, and signed it November 19, 1789.

Statehood. The western section of North Carolina, now Tennessee, was given to Congress in 1784. The inhabitants revolted and established the state of Franklin, but this state was dissolved and the territory again ceded to the United States in 1790. The Old North State steadily prospered, and in 1835 adopted a new constitution providing for representation in the senate based on property, and in the house of representatives, on population.

North Carolina at first opposed secession, but after Lincoln's call for troops to coerce the seceding states to remain in the Union, a popular convention passed an ordinance of secession, May 20, 1861. The state lost the first soldiers of the war at Big Bethel, and, furnishing almost double its share of troops (120,000), suffered the heaviest losses throughout the war. At the close of the war, a new constitution was adopted, abolishing slavery and granting the negro the privilege of suffrage, and the state was readmitted to the Union in July, 1868. During the Reconstruction period political struggles were bitter and violent, and military authority was proclaimed.

A new constitution was adopted in 1876, which was revised in 1879 and 1888. In 1900 amendments were added, practically excluding negroes from suffrage by the institution of educational and property tests. Since the organization of parties, the state has been Democratic except from 1840 to 1848 and when Grant was elected in 1868 and 1872. In 1907 the state came into conflict with the Federal government by passing rigorous measures regulating railroads, which in the next year were declared unconstitutional by the United States Supreme Court. In 1921 $50,000,000 was appropriated for hard roads and nearly $7,000,000 for educational and charitable institutions.

Other Items of Interest. Raleigh, the capital of North Carolina, is in almost the same longitude as Niagara Falls.

An interesting industry is the growing of flower bulbs, which is extensively carried on in one of the southeastern counties. Even Holland, long famed for its tulips and hyacinths, does not produce better bulbs.

The Dismal Swamp, unlike most swamps, is not unhealthful, for it has no decayed vegetation and no miasma. Its air is pure and sweet, and its water, to which the juniper has given

a wine tint, is said to have health-giving properties.

The southward shore current and the northward-bound Gulf Stream meet off the coast of North Carolina, and the turbulent region where the meeting takes place is called by sailors "Little Hell."

In some of the pine forests of the state are found curious samples of wood that has been converted to iron. The knots and the grain of the wood are plainly visible, but they are metal and not wood.

Mount Mitchell, the highest peak east of the Mississippi, was named for Dr. Elisha Mitchell, who was killed by a fall over one of its precipices. His grave is on the summit.

From the top of Mount Mitchell seven states may be seen. E.B.P.

Consult Salley's *Narratives of Early Carolina;* Fitch's *Some Neglected History of North Carolina.*

Related Subjects. The following articles in these volumes are recommended to the reader who desires to know more of the geography and the activities of North Carolina:

CITIES

Asheville	High Point
Charlotte	Newbern
Concord	Raleigh
Durham	Rocky Mount
Elizabeth City	Wilmington
Greensboro	Winston-Salem

COASTAL FEATURES

Albemarle Sound	Hatteras, Cape
Fear, Cape	Pamlico Sound

LEADING PRODUCTS

Corn	Oyster
Cotton	Peanut
Cottonseed Oil	Shad
Herring	Sorghum
Kaolin	Sweet Potato
Lumber	Tobacco
Mica	Turpentine

SURFACE FEATURES

Appalachian Mountains	Piedmont Region
Black Mountains	Roanoke River

NORTH CAROLINA, UNIVERSITY OF, at Chapel Hill, a pioneer institution of learning in the South, and one of the oldest state universities in the United States. It received its charter in 1789, opened in 1795, and by the beginning of the War of Secession had a student enrolment of 430. During the first half century of its existence it graduated many who afterward became notable national and state officials, including a United States President, James K. Polk, Senators, Representatives and Cabinet members. On the outbreak of the war fourteen members of the faculty and a large number of the students volunteered for active service, and when peace came the institution was almost without resources. Brave efforts were made to maintain it, but during the reconstruction period its sessions had to be abandoned. In 1875, through the loyalty of friends and alumni, the institution was reopened, and since 1881 has enjoyed the benefit of state appropriations. It now has a campus of fifty acres, over twenty buildings, and a library of 72,000 volumes.

The university comprises a college of liberal arts, a college of applied sciences, a graduate school and schools of law, mining, pharmacy and engineering. Graduates of colleges and universities, candidates for the ministry, teachers and young men preparing to teach have the benefit of instruction without paying tuition fees. The student body numbers nearly 2,600, and the faculty about 100.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS, opened in 1889 at West Raleigh, is one of the land-grant colleges whose establishment was provided by the Morrill Act of 1862 (see AGRICULTURE, subhead *Land-Grant Colleges*). It is supported both by state and by Federal appropriations. The college grounds, including an experiment farm, occupy a tract of land about 400 acres in extent, and the buildings and equipment are valued at $850,000. This institution offers technical and industrial courses, maintaining departments of agriculture and of chemistry, schools of civil, electrical and mechanical engineering, a textile school, a veterinary school and a summer course in agriculture. English, mathematics, science and modern languages are included in all courses of study. The college experiment station coöperates with the state department of agriculture, and comprehensive extension courses in agriculture are carried on. The institution is equipped with a library of about 10,000 volumes; there are over sixty instructors and the student enrolment is over 800.

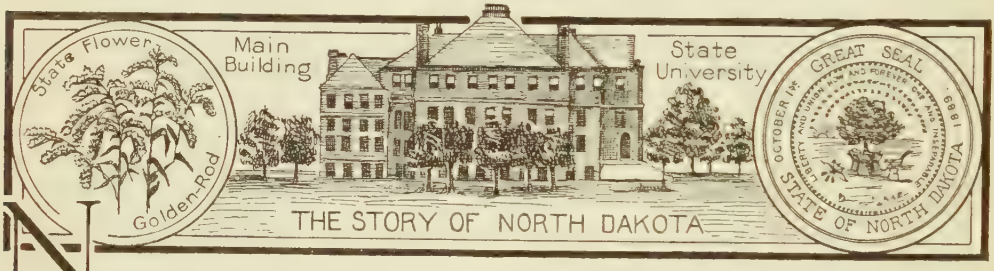
NORTHCLIFFE, *north'clif,* ALFRED CHARLES WILLIAM HARMSWORTH, Lord (1865-1922), the chief proprietor and director of London's most powerful journals. Through his papers he exerts an immense influence upon English public life and opinion and has brought about many social and economic reforms. At the outbreak of the War of the Nations he vigorously upheld the alliance of Great Britain with France and Russia and favored conscription. He openly

opposed the Liberal press and Ministry and was influential in causing the resignation of the Minister of War, the ultimate fall of the Liberal and Coalition governments and the appointment of Lloyd George as Prime Minister in December, 1916.

Alfred Harmsworth was the son of a barrister of Chapelizod, in Dublin County. Without influence or friends he began his journalistic career as a "free-lance" writer on the London press. He became the proprietor of a weekly journal called *Answers* and, later, of the *Evening News* and *Daily Mail*, and his management of these papers marked a new era in English journalism. In 1908 he became chief owner of *The Times*, England's greatest newspaper, popularly called "The Thunderer." In 1904 he was created a baronet and in 1905 was made Baron of the Isle of Thanet. Shrewd, impulsive, self-confident, indifferent to the conventions of British life, he has aggressively sustained radical policies.

He owns more daily and weekly newspapers and magazines than any other man in the world. To supply these he has built large paper mills in Labrador with a capacity of nearly 100,000 tons of print paper a year. These he offered to loan to American publishers in 1917, during the War of the Nations, when the American paper supply was threatened and prices were abnormally high.

In June, 1917, Lord Northcliffe was appointed as the head of the British War Commission in the United States. Such a body was needed to coördinate activities relating to the conduct of the war, particularly in the matter of supplies for the allied cause. The Commission was charged with no political power.



NORTH DAKOTA, one of the north-central states of the American Union, a prairie state lying on the Canadian frontier and having the largest wheat fields in the United States. Its name, meaning *allies*, is derived from that of the Indian nation, or Sioux Confederation, which inhabited the region now comprising North Dakota and the adjacent states. The goldenrod is the state flower.

Size and Location. Having an area of 70,837 square miles, of which 654 square miles are water, North Dakota ranks sixteenth in size among the states. Its area is 780 square miles greater than that of Oklahoma and about one-fifth that of British Columbia. The state is rectangular in shape, its length from east to west being 150 miles greater than its width from north to south, and with the exception of the east border with Minnesota, which is formed by the Red River, its boundaries are straight lines.

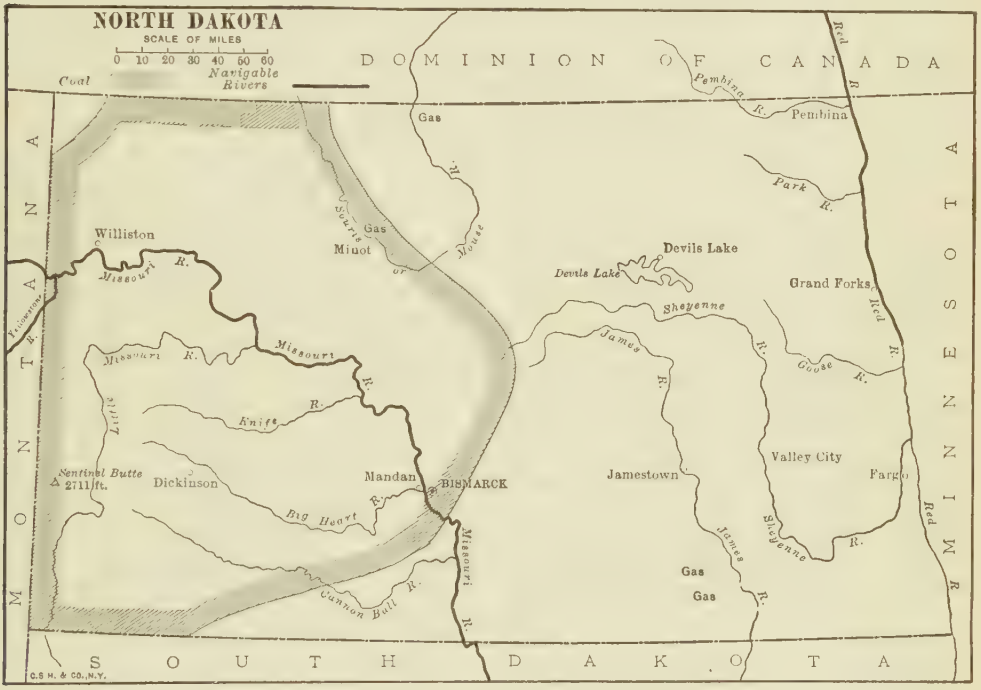
The People. As in all of the newly-developed Western states, the number of inhabitants in North Dakota is comparatively small, for the average number of people is only about ten per square mile. In 1920, when it had 646,872 inhabitants, North Dakota ranked thirty-sixth in population among the states. More than one-fifth are of foreign birth, chiefly Norwegian, Russian, Canadian and German. In 1920 there were 6,254 Indians confined in the reservations of the state. In 1920 Fargo, Grand Forks and Minot were cities with over 10,000 inhabitants. The other principal cities are: Bismarck, the capital; Valley City, Minot, Devils Lake, Jamestown and Mandan. The population of the state on January 1, 1910, was 577,056.

The Roman Catholic and Lutheran churches have the largest memberships. Other denominations of importance are the Methodists, Presbyterians, Congregationalists and Baptists.

Education. The excellence of North Dakota's school system is seen in the state's low illiteracy, which averages only 3.1 per cent. At the head of the public schools are the superintendent of public instruction and the state board of education. County schools are administered by county superintendents. In 1913 inspectors of high schools and rural, graded and consolidated schools were appointed; the state appropriations for schools were increased,

and a teachers' retirement fund was established. School revenues are derived from the state fund, district taxes and large appropriations from the sale of public lands. There is a large annual expenditure for public education. There are two county agricultural schools, and summer schools are held in many places. The state maintains normal colleges at Valley City, Mayville, Minot and Ellendale; a school of sciences at Wahpeton; an industrial school at Ellendale; the state university at Grand Forks; an agricultural college near Fargo; a school of forestry at Bottineau. Other important institutions of higher education are Fargo College at Fargo; Jamestown College at Jamestown; Wesley College at Grand Forks.

A board of charities, created in 1911, has supervision over state institutions of charity and correction, which include a hospital for the insane at Jamestown; a home for the feeble-minded at Grafton; a reform school at Mandan; a school for the blind at Bathgate; a school for the deaf at Devils Lake; a tuberculosis sanitarium at Dunseith; a penitentiary at Bismarck in which compensation is granted for prison labor. There is a soldiers' home at Lisbon not under the control of the state board.



OUTLINE MAP OF NORTH DAKOTA

Showing boundaries, navigable rivers, principal cities, coal measures, natural gas regions, and the highest point of land in the state.

The Land. North Dakota is part of the great prairie region extending through the middle west of the United States and far into Canada. The state consists of three level or gently rolling plains, rising one above the other, from east to west. The lowest section is the broad, level valley of the Red River, which near the Canadian border reaches a width of nearly sixty miles. This valley rises gradually to the rolling gray prairies of the central plain, in which the only section of high elevation is the Turtle Mountain region. West of the central plain the Plateau du Coteau du Missouri (the Plateau of the Hill of the Missouri), a bold, wooded escarpment, extends from the northwest corner diagonally across the state, dividing it into two distinct, triangular sections. The highest point of land is Sentinel Butte, 2,711 feet.

The smaller section southwest of the plateau contains rough, semiarid valleys broken by numerous buttes. Uneven wastes known as "Bad Lands" border the streams. These lands are billowy plains of clay and melted slag covering fields of lignite coal, which in many places have ignited, emitting smoke and sulphurous fumes from seams and crevices. The region has been

sculptured into fantastic forms by fire, wind and rain. Back from the streams the surface is more level and its few grassy hollows are used for grazing; in cold weather, the cattle gather around these burning coal seams to keep warm.

Rivers and Lakes. The eastern portion of the state is drained into Hudson Bay by the Red River and its tributaries, the Sheyenne, Goose and Pembina rivers, the latter entering the main stream a little south of the Canadian boundary. The Dakota, or James, River, flowing 600 miles from the central plain of North Dakota through South Dakota where it joins the Missouri, drains the south-central part of the state. It is unnavigable throughout most of its length. The Mouse, or Souris River, enters the north-central part of the state from Saskatchewan, and, doubling on its course, reënters Canada in Manitoba and unites with the Assiniboine. The western part of the state is drained by the Missouri and its tributaries entering it from the west, the most important of these being the Little Missouri, which has a course of 250 miles in the state; the Cannon Ball, Heart and Knife rivers, and the Yellowstone, which joins it just within the western boundary.

The treeless prairies of the central region are dotted with hundreds of small lakes, the largest of which is Devils Lake, an irregular body of brackish water, lying 1,467 feet above the sea, its wooded shores being the most popular summer resort of the state.

Climate. Owing to the excessive dryness of the climate, the intense cold of North Dakota's long winters is not felt as keenly as the cold of the more humid latitudes farther south. The winter temperature ranges from 5° F. to 12° F. The snowfall is light, and cattle graze in the open plains throughout the year, but frequent blizzards from the northwest cause great damage among unprotected flocks and herds. The summers are cool and delightful, the average temperature being about 65° F. In the midsummer there are sixteen hours of sunlight a day. The rainfall is heaviest in the Red River Valley, where it is sufficient for agricultural purposes. The annual precipitation of the state averages eighteen inches. This lack of humidity renders all seasons healthful and invigorating.

Agriculture. In the rich bottom land of the Red River Valley is grown the greatest crop of spring wheat produced in any section of the United States. North Dakota leads all of the states in the production of the "number 1 hard" variety, which ranks foremost in the wheat market and makes the best quality of flour. This state also ranks first in the Union in the production of flaxseed. Oats, barley, hay, corn, potatoes and rye are other important crops which give North Dakota fourteenth place among the agricultural states of the Union.

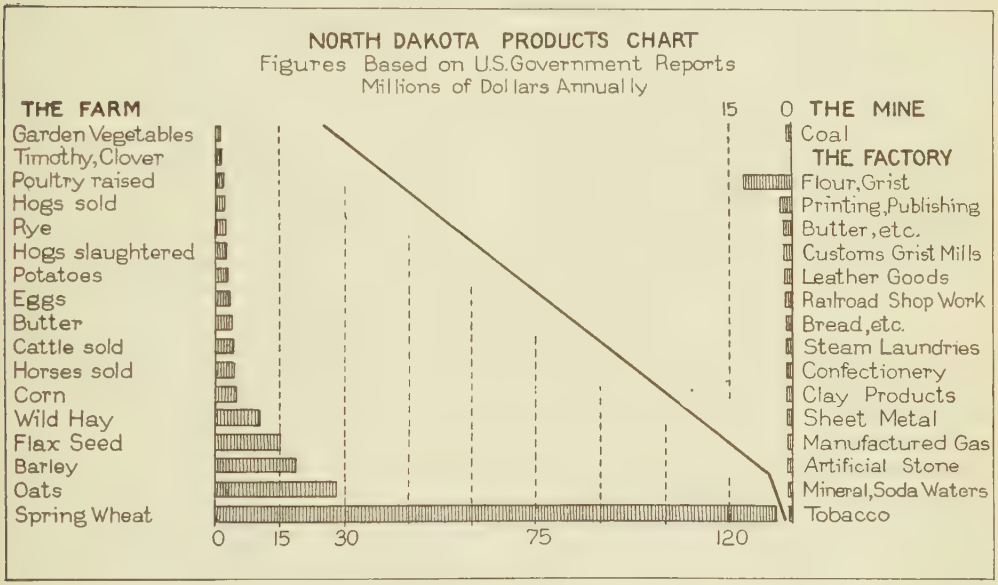
Beyond the Red River Valley, the land is better suited to ranching, and North Dakota is among the important live-stock states. The central and western prairie lands of wild grasses afford excellent pasture and winter feed. The total value of the live stock of the state in 1916 was estimated at $138,311,000. The millions of acres of unappropriated land are rapidly being taken up by "homesteaders," and many of the large ranches of the west are being converted into small farms with the increasing use of irrigation. Most of the irrigation is confined to the Missouri River Valley. The bed of the river being too far below the surrounding country to permit the usual gravity methods of irrigation, deep gulches are cut, into which the water flows intermittently, and floods the surrounding country. Water for irrigation purposes in the south and east is furnished by the numerous artesian wells of that section. The forested area of the state is very small, the only wooded regions being in the Pembina and Turtle mountains, and on the borders of Devils Lake and the Missouri River.

Minerals. The state is of little importance in the production of metals, and its only important mineral product is lignite coal. The entire southwest section is underlaid with thin beds of this half-made coal. This lignite (the soft coal of Germany) has proved of great value to the settlers of the vast, treeless areas, where no other fuel is to be found. As a source of cheap power it furnishes fuel for the large irrigation plants in the western part of the state. Clay used in the manufacture of brick and pottery, natural gas, sand, gravel and some commercial mineral waters are produced. The total value of the minerals produced annually in the state is about $1,925,000 (1920 census report), two-thirds of which is in coal.

Manufactures. The only manufactures finding a market outside of the state are the flour mill and gristmill products, brick and pottery. White wheat flour is the most important product of the mills, which also produce large quantities of offal, feed, grits, Graham flour, corn meal and rye flour. Dickinson and Hebron manufacture pressed brick of excellent quality. Printing and publishing and the making of but-

ter are the other chief manufacturing industries of the state. In 1920 the state had 894 factories, capitalized at $24,550,000. The value of the products in that year of high prices was $57,374,000.

Transportation. Two western trunk lines, the Great Northern and Northern Pacific railroads, cross the state from east to west, and accommodations in the north and east portions of the state are afforded by many branch lines and short spurs of these roads. The "Soo" crosses the state in a northwesterly direction, and the Chicago, Milwaukee & Saint Paul traverses the southwest corner. There are over 6,100 miles of railroad in North Dakota. The Missouri River may be navigated by a careful pilot throughout its entire course in the state, and the Red River is navigable from Fargo to its outlet at Lake Winnipeg. Only 200 miles of the public roads, which cover 61,593 miles, are improved. In 1914 an amendment was adopted providing for appropriations and taxes to create a state fund for the improvement of roads.

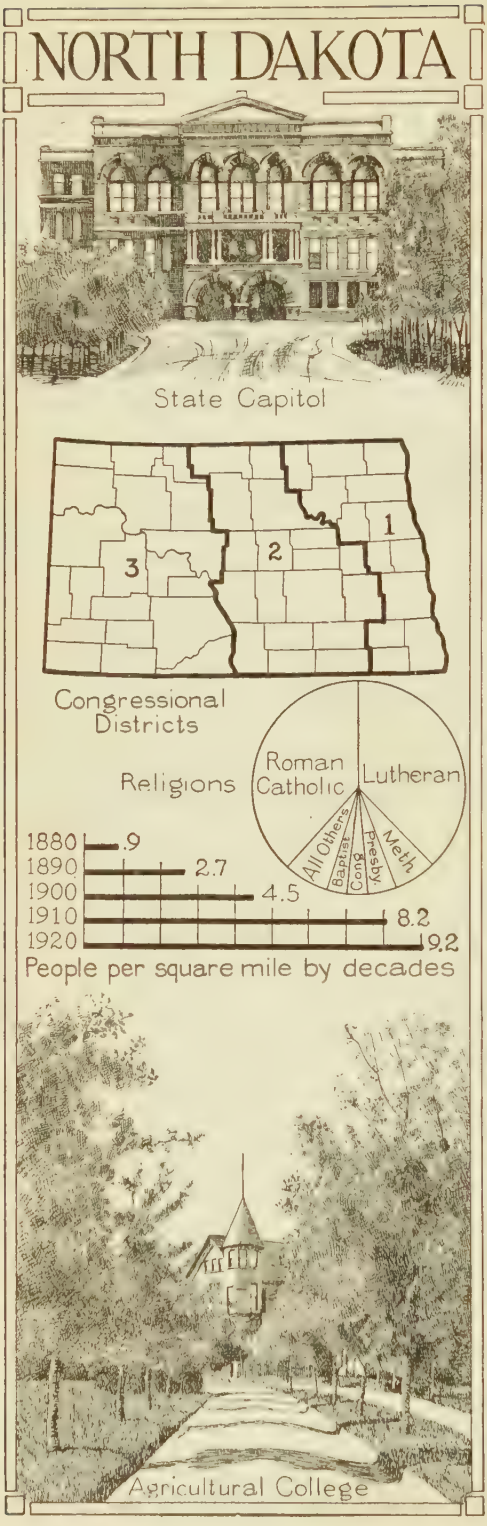


Government. The first and present state constitution of North Dakota was adopted in 1889. Amendments may be proposed in either house of the legislature or by the people, but to become effective, they must be adopted by a majority of the members of the two successive legislatures and a majority of the voters. Every male citizen, twenty-one years of age, residing in the state one year, in the county six months, and ninety days in the precinct in which the election is held, is entitled to vote. Civilized Indians who have severed tribal relations two years preceding elections are qualified on the same terms as the white population. Women may vote in school elections and are eligible for any school office. Provision is made for a preference vote for President and Vice-President. North Dakota is one of the few states in which absent voting is allowed, the ballots of absent voters being forwarded by mail.

The *legislature* consists of a senate of thirty to fifty members and a house of representatives of sixty to 140 members, meeting biennially. Senators are elected for terms of four years, and representatives for two years. Initiative and referendum are in full force.

The *executive* power is vested in the governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction, attorney-general and commissioners of agriculture, labor, railroads and insurance, all of whom are elected biennially. The governor has power to disapprove of any items or bills of appropriation, and to remove any county or municipal officer for incompetence, misconduct or crime.

The *judicial department* consists of a supreme court, twelve district courts, county or probate courts, justices of the peace and such inferior courts as are established by law. The supreme court is composed of five judges elected for six years, and it has general control over



the inferior courts and appellate jurisdiction. In 1915, capital punishment was abolished. All judges and the superintendent of public instruction are elected by a nonpartisan vote. Since 1914, judges have been subject to recall.

Counties are administered by boards of commissioners. Any village or city having over 500 inhabitants may adopt the commission form of government, under which the voters may exercise the right of initiative and referendum. All city and village elections have nonpartisan nominations by petition.

North Dakota is among the few states in which the sale or manufacture of intoxicants is prohibited by the constitution; liquors may not be sold even for medicinal uses. There are strict laws controlling railroads and corporations. In 1915, a state budget board consisting of the governor, attorney-general, auditor and five other members, was created, and mothers' pension laws were passed.

History. *Settlement and Territorial Government.* The territory was acquired in the Louisiana Purchase in 1803 but remained unorganized for about thirty years. French Canadians had settled at Pembina as early as 1781, and traders of the Hudson's Bay Company established posts in the Red River Valley about 1793. Lord Selkirk, considering the region British territory, erected a fort near Pembina in 1810. Several American explorers visited the territory in the early nineteenth century, including Lewis, Clark, Fremont and Warner. In 1851, the Sioux Indians ceded a portion of the territory to the government and these lands were opened for settlement. That part of the present state of North Dakota east of the Missouri River was included successively in the Territory of Michigan, organized in 1834, Wisconsin Territory in 1836, Iowa Territory in 1838, and Minnesota Territory in 1849. The western section of the present state, with parts of the states of Idaho, Wyoming and Montana, became a part of Nebraska Territory in 1854.

On March 2, 1861, the Territory of Dakota was created, including the present states of North Dakota and South Dakota and parts of Wyoming and Idaho. Two years later, when Idaho Territory was formed, the boundaries of the Dakotas were fixed at their present limits. The development of the territory was retarded by the War of Secession without, and the Indian hostilities within, its borders. The worst of the Sioux wars occurred in 1864 and 1865, and for many years there were occasional attacks. After 1866, the population increased,

RESEARCH QUESTIONS ON NORTH DAKOTA

(An Outline suitable for North Dakota will be found with the article "State.")

Are the days in North Dakota longer or shorter than in the state in which you live?

Why do trees have larger roots in North Dakota than in Florida?

What is the state flower? What other states have chosen the same emblem? (See FLOWERS, subtitle *State Flowers.*)

What are the Bad Lands? Is any part of them of any use?

How did the state receive its name? What does the name mean?

What feature of the climate has given the state a popular name or nickname?

How many states are larger than North Dakota? How many of these lie to the east of it?

How many of these larger states have a larger population?

How does the state compare in number of inhabitants per square mile with the country as a whole?

How does it compare in this respect with the states on which it borders? With the Canadian provinces on the north?

What are the "walled lakes," and how are they formed?

How many Indians live in the state? Are there more or fewer than there are in North Carolina?

What are the natural "furnaces" by which the cattle keep themselves warm in the coldest months? In what part of the state are they located?

Why has the largest lake of the state salt water?

What is "number 1 hard," and how does North Dakota rank in its production?

What is making it possible to convert the large ranches of the western part of the state into small farms?

What is the railway mileage of the state to each hundred square miles of area? How does it compare in this respect with the neighboring states?

How does the method of irrigation employed in the valley of the Missouri differ from that in use in other states?

What is *lignite?* How does it differ from ordinary coal?

Show how the manufactures of the state depend on the other industries or the natural resources.

How many constitutions has the state had?

What must an Indian do in order to be given the right to vote?

How could a North Dakota citizen who was in Minneapolis on election day take part in the election?

What are initiative, referendum and recall?

How does North Dakota's action on the liquor question differ from that of most of the states?

When and how did this territory come into the possession of the United States?

Of what other territories has this region, in whole or in part, formed a part?

How did the organized territory of Dakota differ in extent from the present state of North Dakota?

What enterprise was of great benefit in the development of this region?

When was North Dakota admitted to the Union?

How many states surpass North Dakota in agriculture? How many surpass it in manufacturing industries?

and a period of rapid development followed the opening of the Northern Pacific railway into this region in 1872. The territory was divided into two sections, north and south, and in October, 1899, North Dakota submitted a constitution which was ratified by the people. On November 2, 1889, it was admitted as the thirty-ninth state of the Union.

Statehood. The railroads have been an important factor in the development of North Dakota, bringing thousands of immigrants into the state by annual excursions, and establishing towns on branch roads. In 1907 laws were passed by the legislature restricting the privileges of the railroads and regulating passenger rates. The state has generally favored Republican policies and has had only two Democratic governors, those elected in 1892 and 1908. In the Presidential elections of 1912 and 1916 Woodrow Wilson, Democrat, received a small plurality of votes. The legislature of 1913 passed the absent-voters act and other measures relative to elections. In 1921 the governor and two other state officers, elected by the Nonpartisan League, suffered recall in an election held in October.

Other Items of Interest. North Dakota is sometimes called the "Home of the Blizzards," for many of those violent storms have their origin there.

In the Bad Lands big game is still to be found, the lynx, wolf and smaller wild animals making their homes there.

The summers in the northern region are short, and satisfactory growth of many crops would be impossible were it not for the length of the midsummer days.

Some of North Dakota's small lakes are surrounded by natural walls of stone, which are built up higher than the surrounding land. Scientists believe that in the winter the expansive power of the ice in these lakes forces the stones to the shore and piles them up into a wall.

Devils Lake has no outlet, and its waters are consequently salty.

Since the air in this state is very dry, plants cannot draw much of their moisture from that source, but must receive it all from the ground. Nature provides them, therefore, with very large roots or tubers, which are well able to look after this work of extracting water from the soil.

Consult Gilbreath's *North Dakota and Her Magnificent Resources;* Willard's *Story of the Prairies.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of North Dakota:

CITIES AND TOWNS

Bismarck	Grand Forks
Devils Lake	Minot
Fargo	Valley City

HISTORY

Hudson's Bay Company	Louisiana Purchase
Lewis and Clark Expedition	Sioux

LEADING PRODUCTS

Barley	Hay
Cattle	Horse
Flax	Oats
Flour	Wheat

PHYSICAL FEATURES

Bad Lands	Red River of the North
Missouri River	Yellowstone River

NORTH DAKOTA, UNIVERSITY OF, the most northerly state university in the United States, was created in 1883 by act of the territorial assembly, and located at Grand Forks. It is maintained principally by income from a state tax and revenues from its holdings of land grants made by the Federal government. The university is organized into colleges of law, liberal arts, mechanical and electrical engineering and mining engineering, a college of education, school of commerce and school of medicine. A mining substation at Hebron and a biological station at Devils Lake are also maintained. At the university are operated a public-health laboratory, the United States Weather Bureau and the Geological Survey. The movement to affiliate church colleges and state universities was begun at the University of North Dakota in 1904. There are over one hundred faculty members, and about 1,650 students. The library contains about 54,000 volumes.

NORTH'ER, a cold north wind which usually blows over Texas and other regions bordering on the western part of the Gulf of Mexico, occurring most frequently from September till March. It is often destructive to vegetation and dangerous to shipping. These winds sometimes start as far north as Canada and blowing southward extend over the entire Mississippi Valley. As they are predicted from twenty-four to thirty-six hours in advance, the Weather Bureau usually sends out warnings of their approach, for the temperature may drop from 30° to 50° in a few hours.

NORTHERN LIGHTS, the popular term applied to the *aurora borealis* (which see).

NORTHERN TERRITORY, the only one of the divisions of the Commonwealth of Australia not sufficiently settled or developed to be a self-supporting state. Its area, 523,620 square miles, is nearly equal to that of Alaska, yet, sparsely inhabited as is Alaska, that territory has about eighteen times as many white inhabitants as the Northern Territory, and probably a larger population of natives. Situated in the northern half of the continent, between Queensland and Western Australia, the Northern Territory was a part of New South Wales till 1863, and under the control of South Australia until it was taken over by the Federal government on January 1, 1911. Its capital is Darwin, formerly Palmerston, situated on the shore of Port Darwin, which is said to be the largest harbor in the world.

LOCATION MAP

In recent years the principal income of the territory has been from tin, though previously gold had been more important. Silver and copper are also mined, and tungsten and other metals have been found. There are about 400,000 cattle, a little over one-third as many as in the average state of the United States or province of Canada, and smaller numbers of sheep, horses and pigs.

The future of Northern Territory seems bright. Though the population (exclusive of the aborigines, of whom no count has ever been taken) is less than it was twenty years ago, this is due to the departure of Chinese, and the white population of about 4,000 is greater than ever before. At present the territory has but one railroad, 145 miles long, and can be reached only by sea. But the government is building a road from South Australia which is expected to stimulate mineral development, the opening of the farm lands of the interior (which can be watered by artesian wells) and the growth of Darwin and other ports. Darwin is from one to two thousand miles nearer to Europe and Asia than any of the other Commonwealth ports except Perth, and is the terminus of the cable from Java, which gives Australia connection with Europe. It is also a wireless station, and is connected with South Australia by overland telegraph.

NORTHMEN, or **NORSEMEN.** Between the eighth and the eleventh century the coasts of the British Isles and of other sections of Western Europe were ravaged by bands of invaders from the Scandinavian peninsula. These bold and adventurous Northmen, or Norsemen, as they are variously called, were the Vikings, or sea rovers, who have contributed so much of romantic interest to the history of medieval Europe. Their life in their Northern homes is picturesquely suggested by Longfellow in his *Skeleton in Armor:*

I was a Viking old!
My deeds, though manifold,
No Skald in song has told,
No Saga taught thee.

* * * * * * *

Oft to his frozen lair
Tracked I the grisly bear,
While from my path the hare
Fled like a shadow;
Oft through the forest dark
Followed the were-wolf's bark,
Until the soaring lark
Sang from the meadow.

A softened form of the name Northmen is found in *Norman,* which was applied to the Norsemen who settled permanently in France and founded Normandy. The Northmen who entered the British Isles were from Denmark. Beginning about 787, they harassed the coasts of England again and again until they were securely established on the island. Though the Anglo-Saxon king, Ethelred I, and his brother, Alfred the Great, sent their best warriors against them, the Danes maintained their power until 1042. Colonies were also made by the Norsemen in the Orkneys, the Hebrides, the Faroe Islands, Iceland and Greenland, and there is a tradition that the Viking Leif Ericson visited the coast of New England in the eleventh century, over four centuries before the first voyage of Columbus to the New World.

It is supposed that the Northmen were incited to leave their homes in Scandinavia because there was insufficient food to support the increasing population. Their natural love of adventure, typical of the imaginative peoples of the North countries, was perhaps no less powerful as an inciting cause. (See illustration on next page.)

Consult Fischer's *Discoveries of the Norsemen in America;* Hovgaard's *The Voyages of the Norsemen to America.*

Related Subjects. The reader is referred to the following articles in these volumes:

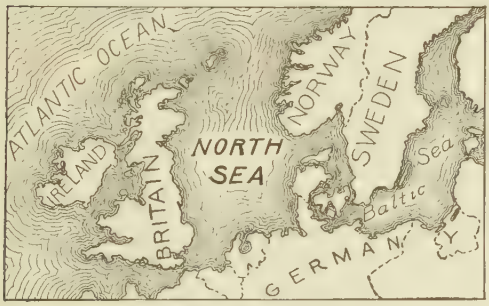
Canute
Eric the Red
England
Normandy
Normans

THE NORTHMEN

NORTH POLAR EXPLORATION. See POLAR EXPLORATION.

NORTHROP, CYRUS (1834-1922), an American educator and university president, born at Ridgefield, Conn., and educated at Yale College. He was graduated at the Yale Law School, in 1860 was admitted to the bar and the next year was made clerk of the Connecticut house of representatives; in 1862 he held the similar office in the state senate. After serving for a time as editor of the New Haven *Palladium* he became, in 1863, professor of rhetoric and English literature at Yale College and remained in that position twenty-one years. From 1884 to 1911, a period of twenty-seven years, he was president of the University of Minnesota, becoming in the latter year president *emeritus*. During his administration the university was brought into closer relations with the school system of the state and its usefulness to Minnesota greatly extended.

NORTH SEA, a division of the Atlantic Ocean, which lies between Great Britain and the continent of Europe. It is nearly 700 miles from north to south and about 400 miles wide. It has a seacoast of 4,000 miles and its area is



THE NORTH SEA

Noted as the location of the world's most extensive herring fisheries and as the scene of naval activity (in the War of the Nations) not equaled in any past age.

nearly 200,000 square miles. It is, therefore, twice the size of the American Great Lakes, and nearly three times as large as New England. On its shores are the harbors of the greatest seafaring nations of the earth, Germany, England and Norway, as well as those of Belgium, Holland and Denmark. The waters of the North Sea mingle with those of the Atlantic and Arctic oceans; it communicates with the Baltic Sea by way of the Kiel Canal, and with the Atlantic through the English Channel.

Under normal conditions exporting and importing are continually going on across the North Sea, and emigrants and tourists travel back and forth, but the coast fisheries, particularly herring, constitute the chief industry. The whole eastern seaboard of England and Scotland is ordinarily devoted to the fishing industry. Norway ships half the world's herring annually. The outbreak of the War of the Nations brought disaster to this industry, and thousands of people were deprived of their chief occupation because of the multitude of submarine mines laid in the North Sea.

The position of the sea gave it admirable strategic importance in the great conflict. The nation which controlled it could cut off the Baltic so that hostile ships could neither leave nor enter, and supplies for the enemy could thus be intercepted. At the beginning of the war, England's naval preparedness enabled it to assume the mastery in these waters, an advantage which was of inestimable value to the allies.

Consult Wood's *North Sea Fishers and Fighters;* Mackinder's *Britain and the British Seas.*

NORTH STAR, or **POLESTAR,** a star of the second magnitude, about 1½° from the pole, the brightest star in the constellation Ursa Minor or Little Bear. This star is easily located, as two stars in Ursa Major (the Dipper) or Great Bear, called the pointers, always point to it. The North Star is of great help as a guide to mariners in northern latitudes; from it they can always get direction and find their location. The Greeks called this star Cynosure, meaning the *dog's tail,* and it is now often called the cynosure, or star that attracts. The polestar is gradually moving nearer and nearer to the pole, owing to the motion of the pole of the heavens around the pole of the ecliptic. It is expected that within the next two centuries it will approach to a distance of one-half degree from the pole and then gradually recede again.

For illustration of the constellation Ursa Minor, see STAR; for explanation of magnitude, see STAR, subhead *Magnitude.*

NORTH SYDNEY, *sid'ni,* a town in Nova Scotia, on the northeast coast of Cape Breton Island. It is in Cape Breton County, fifteen miles by the Intercolonial Railway northwest of Sydney, the county town. There is hourly service between Sydney and North Sydney, and from the latter steamers also run to Port aux Basques, Newfoundland, Montreal, Halifax and other Canadian ports. The fisheries of the vicinity are important and furnish a livelihood to a considerable part of the population, but the local industrial plants, including coal mines,

granite works, planing mill, stove factory and a plant for making coal briquettes are also noteworthy. The town has large coal docks, and is an important bunkering port. Population in 1911, 5,418; 1921, 6,583.

NORTH TONAWAN'DA, N. Y., a city in Niagara County, on the western border of the state, noted for its lumber and iron interests. It is situated on the Niagara River, at the point where it receives Tonawanda Creek, which separates North Tonawanda from Tonawanda. Buffalo is five miles south by rail. Transportation is provided by the Erie, the Wabash, the West Shore, the Lehigh Valley and the New York Central railways and by an electric line. The Erie Canal passes through the city. North Tonawanda has a large output of pig iron and foundry and machine-shop products, and steel and cement building material. It also manufactures equipment for pleasure resorts, such as steam merry-go-rounds, small railroads, motor boats and automatic organs. The city hall, high school and Carnegie Library are the noteworthy buildings. North Tonawanda received its city charter in 1897. In 1910 the population was 11,955; in 1920 it was 15,482, a gain of nearly 30 per cent. The area of the city is nine square miles.

NORTH VANCOUVER, *van koo'ver,* a city in British Columbia, on the north shore of Burrard Inlet, two miles from and directly opposite the city of Vancouver, of which it is a residential and industrial suburb. It is on the Pacific Great Eastern, the new railway which will open a vast territory in the interior of the province. Vancouver and this suburb have a twenty-minute ferry service, and will soon be connected by railway over a bridge to be built at the Second Narrows. Population in 1921, 7,652.

North Vancouver's principal industrial plants are shipyards, but scarcely less important are lumber mills and sash-and-door factories. There is also a large cold-storage plant, and rock quarries are near by. The central high school, which cost $200,000, the drill hall, erected in 1915, Heywood and Mahon parks and the 150-foot boulevard surrounding the city are striking features. The single-tax principle has been adopted for municipal purposes. North Vancouver was founded in 1906, and was incorporated as a city in the same year.

NORTHWESTERN UNIVERSITY, the largest institution of higher learning under the management of the Methodist Episcopal Church, was chartered in 1851 and located in Evanston, Ill., twelve miles north of the center of the city of Chicago, on the shore of Lake Michigan. The charter provided that the university properties were to be free from taxation, that no liquor could be sold within four miles of it, and that a majority of the controlling board must be members of the Methodist Church. About the university grew up the town of Evanston, so named in honor of Dr. John Evans, the head of the university corporation at the time.

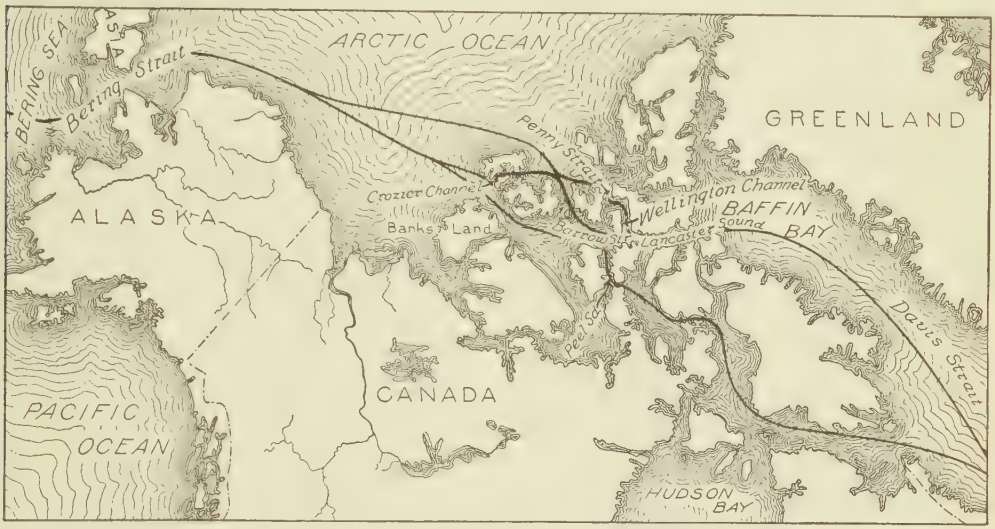
For more than ten years the only department was the college of liberal arts. Since then the college of engineering, the graduate school, the school of oratory and the academy have been added on the beautiful campus at Evanston, and not far distant is the school of music. In the Northwestern University Building in the heart of Chicago are the schools of law, dentistry, pharmacy and commerce. The medical school is located on the south side in Chicago. Affiliated with the university are Garrett Biblical Institute (on the campus) and the Norwegian-Danish Theological Seminary and the Swedish Theological Seminary, both in Evanston. Two secondary schools are maintained; these are Grand Prairie Seminary at Onarga, Ill., and Elgin Seminary at Elgin, Ill. The Academy at Evanston was abandoned in 1917.

Notable features of the university are several fine new dormitories for men, built on the quadrangle plan; one of the best-equipped gymnasium buildings in the world, the gift of James A. Patten; and the Dearborn Astronomical Observatory. Included in the library of over 194,000 volumes is the Gary collection of law books, one of the largest of its kind in existence. The student body numbers about 9,000. There are over 600 instructors.

NORTHWEST PASSAGE, the historic name of the passage between the Atlantic and Pacific oceans, along the north coast of North America, long sought by navigators in the effort to discover a shorter route to India. When Constantinople came into possession of the Turks in 1453, European merchants were deprived of their most convenient route to the East, and the desire to find a new trading route was for years an incentive to the most daring navigators of Europe. Though the Europeans quickly learned that the new continent discovered by Columbus was not India, they firmly believed that by proceeding westward and northward across the continent they would find a passage that would enable them to reach the Pacific and the countries of the East. The

passage was eagerly sought for four hundred years before it was discovered. Now that it is known and charted, no use is made of it. The story of the search follows.

As early as 1524 Verrazano, sailing under the French flag, made an effort to find this passage, and he explored northward as far as Rhode Island. Henry Hudson, who was sent out by the land and Denmark were also active in the work in the north, and by the close of the eighteenth century, though the Northwest Passage had not been sighted, Hudson Strait and Bay, Davis Strait and Baffin Bay, the icy seas from Greenland to Spitzbergen and from Spitzbergen to Nova Zembla had all been explored, while Hudson Bay Territory and Greenland had been set-



MAP OF THE NORTHWEST PASSAGE
Black lines indicate the various routes taken by explorers.

Dutch East India Company to find a shorter route to the South Seas, thought that he had discovered the opening into the Pacific when, in 1609, he anchored in what is now New York Bay; he sailed up the river named Hudson in his honor, convinced that this stream reached across the continent.

England, however, made the most persistent attempts to find the passage, and Sir Martin Frobisher began a series of English expeditions in 1576 that were to last nearly three centuries. Frobisher's work was of great importance, including the discovery of Frobisher Bay, an indentation in Baffin Land. The great scientific seaman, John Davis, made the next attempt; he traversed the strait that since has borne his name, and in 1587 advanced as far north as 70° 41′.

Of still greater importance was the expedition begun in 1616 by William Baffin and Robert Bylot. These explorers sailed up Davis Strait and round the great channel which has been since known as Baffin Bay, and their observations were of great value to later explorers who continued the historic search. Russia, Holtled. For the details of this important period of exploration, the reader is referred to the articles Polar Exloration and Arctic Lands and Seas.

The French Revolution and the Napoleonic wars that followed so occupied the attention of all Europe that the search for the Passage was practically abandoned for a quarter of a century, and interest in it did not revive until after the peace of 1815. In 1818 began the final series of expeditions, when Commander John Ross was sent out in command of the *Isabella* and the *Alexander*. Among the names of the explorers who followed him, most celebrated is that of Sir John Franklin, whose successful though ill-fated expedition for the Northwest Passage set sail from the Thames on May 20, 1845, in the *Erebus* and *Terror*.

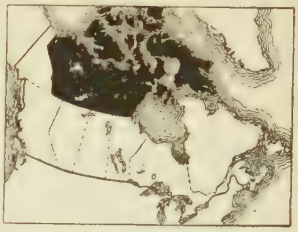
Franklin passed through Lancaster Sound, sailed up Wellington Channel to Penny Strait and down Crozier Channel, returning to Beechey Island for winter quarters. On leaving Beechey Island in 1846 he found a channel (now Peel Sound) leading south, down which he sailed towards King William Island, with land on both

sides. As soon as the southern point of the western land was passed, however, the expedition was blocked by an immense ice stream from Melville Island, and the company made its way to the northwest coast of King William Island, where Franklin died in June, 1847. The survivors attempted to reach the Great Fish River but, after abandoning their ships, they, too, perished, "forging the last link of the Northwest Passage with their lives." To Sir John Franklin is due the honor of being the first discoverer of the Passage, for the point reached by his ships brought him to within a few miles of the known waters of Northwestern America, leading directly to the Asiatic shore.

When it became a certainty that the Franklin expedition would never return, numerous expeditions, about forty in all, were sent out to discover traces of the heroic company, and many important discoveries were made. Of special interest is the voyage of Sir Robert McClure, who in 1850 set out in the *Investigator,* proceeding to the scenes of the Franklin expedition by way of Bering Strait. In October he ascended a hill on the Princess Royal Islands whence he could see the frozen surface of Barron Strait, thus actually viewing the Northwest Passage. In the spring of 1851, as soon as navigation was open, he sailed around the southern end of Banks Land and forced a passage northward to the northern shore of that island, anchoring his ship in the bay which he named God's Mercy. This expedition continued the trip eastward on the ice, but the enterprise fell short of complete success, for the ship had to be abandoned. In 1905 Roald Amundsen, the discoverer of the South Pole, made the trip through the Passage from the Atlantic to the Pacific on the ship *Gjoa,* passing between the American mainland and the coast islands to Bering Strait. The *Gjoa* was the first vessel to sail through the Northwest Passage, and so the year 1905 saw the culmination of the long series of expeditions having as their object the discovery of a water route between the two great oceans. B.M.W.

Consult Greely's *Handbook of Polar Discoveries;* Amundsen's *Northwest Passage.*

NORTH WEST TERRITORIES, all that part of Canada, except the Yukon, lying north of the great provinces. The Territories comprise all of Canada, including islands, north of the sixtieth parallel, except the Yukon and the northern tip of the Labrador peninsula, which lies in Quebec. The area of this vast region is 1,242,224 square miles, approximately one-third of the total area of the Dominion. The population, which was 18,481 in 1911, consists largely of Indians and half-breeds; the number of white men does not exceed 2,500. Practically the whole of the Territories is a plain, broken by numerous lakes and rivers and sloping toward Hudson Bay and the Arctic Ocean. Geologically most of the section belongs to the Laurentian Plateau. The largest lakes are Great Bear and Great Slave, and the principal rivers are the Mackenzie, the Coppermine, Backs and Dubawnt; the last empties into Hudson Bay, the others into the Arctic Ocean.



LOCATION MAP
To the west is Yukon; to the south, the great empire-provinces of Manitoba, Saskatchewan, Alberta and British Columbia.

Resources. The Mackenzie River basin is heavily wooded with birch, pine, spruce and other species, and the southern part of the Territories generally has a fair sprinkling of trees. To the north, however, vegetation becomes stunted, and finally disappears entirely, except for mosses and lichens, in the barren, semiarctic regions. There are extensive deposits of minerals in various parts, notably coal along the Mackenzie River, salt and coal near Great Slave Lake, and gold and copper farther east. The exploring expedition led by Vilhjahlmur Stefansson in 1916 discovered large copper deposits along the Coppermine River. These resources are as yet of no commercial value. The chief present asset of the Territories is fur-bearing animals, among which are bears, beaver, otter, mink and ermine.

Government and History. The government of the great Northwest is largely in the hands of the Royal Northwest Mounted Police (which see). The official head of the administration is a commissioner, who resides at Ottawa; he is appointed by the Governor-General in Council. Until 1869 Rupert's Land and the North West Territory, then including more than double the area of the present Territories, was the property of the Hudson's Bay Company, which surrendered its governmental but not its trading privileges for $1,500,000. Between 1869 and 1912 the area of the North West Territories was gradually lessened, first, by the creation of the province of Manitoba in 1870, by the separation of the Yukon in 1898, then by the erec-

tion of Alberta and Saskatchewan into provinces in 1905, and, finally, by the enlargement of Manitoba, Ontario and Quebec in 1912. For administrative purposes the North West Territories at one time were also divided into the districts of Alberta, Assiniboia, Athabaska, Saskatchewan, Franklin, Mackenzie and Ungava.

Related Subjects. The reader is referred to the following articles in these volumes, as well as to those on the provinces and districts named above:

Fur and Fur Trade
Great Bear Lake
Great Slave Lake
Hudson's Bay Company
Mackenzie River
Royal Northwest Mounted Police

NORTHWEST TERRITORY. After the Revolutionary War in America seven of the states claimed title to a great section of land lying west of their populated territory, for the charters granted to many of the colonies gave them rule from sea to sea. When the committee appointed in 1776 to draft the Articles of Confederation reported to Congress the following year, that body voted to accept the proposed constitution, but all the states were required to sign it before it became effective. Maryland refused to sign until the states claiming the Western territory should give it to the national government. Finally, after four years' delay, New York agreed, Virginia, Connecticut and Massachusetts having already promised to do the same. Maryland signed the Articles in 1781, but Georgia and North and South Carolina held their territory several years longer.

The large tract of land ceded by the first four states, lying north of the Ohio River and east of the Mississippi, became known as the Northwest Territory, when in 1787 an ordinance providing for its government was adopted. This stated that no fewer than three and no more than five states should in the future be formed from it. Out of the Northwest Territory the five great states of Ohio, Indiana, Illinois, Michigan and Wisconsin were accordingly formed in the years from 1802 to 1848, for civilization moved rapidly westward. That part of Minnesota lying east of the Mississippi was also a portion of the Northwest Territory. See ORDINANCE OF 1787.

Consult Hinsdale's *The Old Northwest;* Moore's *The Northwest under Three Flags.*

NORTH YAK'IMA, WASH., which became YAKIMA in 1917 by dropping the word NORTH, is the county seat of Yakima County, in the southern part of the state about midway between its eastern and western borders. Ellensburg is forty miles north, and Tacoma is 160 miles northwest. Through the service of the Northern Pacific and Oregon-Washington Railway and Navigation Company, direct connections are made with important cities in all directions. An electric line extending into neighboring districts provides good freight and passenger service. North Yakima was settled in 1885, Yakima City being practically moved to North Yakima; in 1886 it was incorporated as a city, and in 1912 the commission form of government was adopted. In 1910 the population was 14,082; in 1920 it was 18,539.

North Yakima is an attractive modern city; about sixty-five per cent of the people own their homes. The most notable building is the Masonic Temple; the keystone in the arch at its entrance was brought from Palestine. Other prominent edifices are a $250,000 Federal building, a $175,000 courthouse, a $200,000 hospital, a Y. M. C. A. building, an armory, a library and a $125,000 high school. Besides its public schools the city has Marquette College and Saint Joseph's Academy. The surrounding region is a productive, irrigated country, well adapted to growing cereals, vegetables and fruits, and the leading industries, the packing and canning of fruits, are dependent on its resources. Dairying and poultry raising are also important, and the lumber industry is rapidly growing. J.A.H.

NORTON, CHARLES ELIOT (1827-1908), an American educator and scholar of note, born at Cambridge, Mass., and educated at Harvard, where he was graduated in 1846. For three years he held a position in a business house in Boston, but his interest in art and literature determined him to give up commercial life, and after a year spent in travel in India and Europe he devoted himself entirely to literary pursuits. From 1855 to 1857 he was again in Europe, from which he returned with a new determination to awaken in America an interest in the culture of the older countries.

In 1864 he became coeditor with James Russell Lowell on the *North American Review,* and this position he held for four years. In 1868 he went a third time to Europe, remaining five years, and two years after his return was made professor of the history of art at Harvard University. This position gave him the opportunity which he had coveted of spreading the cult of beauty, and he became the most noteworthy figure in America in the field of aesthetics. He was also an authority on Dante, and published translations of the *Divine Comedy* and the *New Life.*

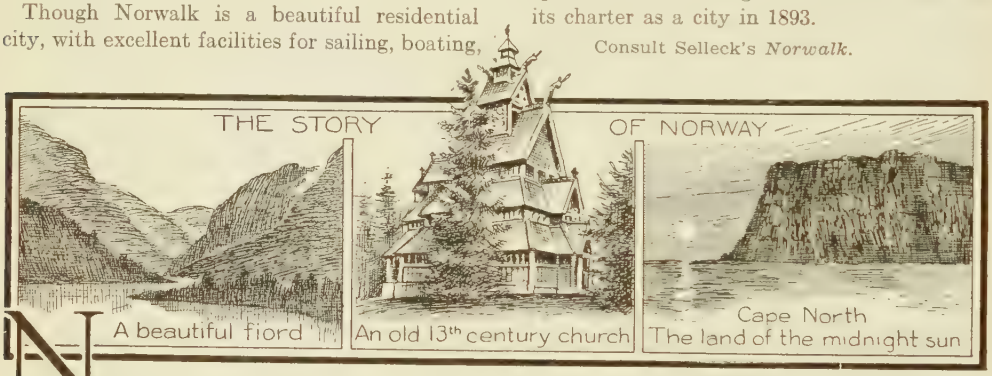
Many eminent literary men of his day were his intimate friends; among these were Ruskin, Emerson, Lowell, Carlyle, G. W. Curtis, Longfellow and Fitzgerald, and of all except the last two he was literary executor.

NORWALK, *nawr'wawk,* CONN., a summer resort with industrial interests, located in Fairfield County, in the extreme southwestern part of the state. It is on the Norwalk River and on Long Island Sound, fourteen miles southwest of Bridgeport and forty miles northeast of New York City. The New York, New Haven & Hartford Railway and interurban lines serve the city, and it has steamboat connection with New York City. The population of Norwalk increased from 24,211 in 1910 to 27,557 in 1920 (14 per cent gain). Its area of seventeen square miles includes the villages of East and West Norwalk, Winnepauk, Rowayton and the cities of Norwalk and South Norwalk, all of which consolidated in 1913 to form the present city.

Though Norwalk is a beautiful residential city, with excellent facilities for sailing, boating, bathing and golfing, it is also an industrial center. The oyster interests are important, and the coast trade is considerable. Straw goods, hats, felt goods, wearing apparel and machinery are manufactured extensively, and the city has a variety of lesser products. Norwalk has a state armory, two Carnegie libraries, the Fairfield County Children's Home and Norwalk Hospital. A feature of interest in the city is the drinking fountain erected by the Daughters of the American Revolution in memory of Nathan Hale, who obtained here his disguise of a Dutch schoolmaster and loyalist before he was taken as a spy by the British.

The site of Norwalk was purchased in 1640 by Roger Ludlow and Daniel Patrick. The first settlement was made in 1649, and the place was incorporated as a town in 1651, South Norwalk being included. In November, 1779, it was burned and plundered by the British under Generals Tryon and Garth. Norwalk was incorporated as a borough in 1836 and received its charter as a city in 1893.

Consult Selleck's *Norwalk.*



NORWAY, the most democratic kingdom of Europe, occupies the western part of the Scandinavian Peninsula (see colored map of Europe following page 2092). It is a narrow strip of rugged country, bounded on the west and north by the Atlantic and the Arctic oceans, and on the south by the Skagerrak, an arm of the North Sea. Archangel, Finland and Sweden adjoin it on the east. Nearly one-third of the kingdom lies within the realm of the "midnight sun," and Cape Nordkyn, the most northerly point of the European mainland, is Norwegian soil. In some places in the north the country is only twenty miles across, but it widens to 260 miles near the south end. Having an area of 124,129 square miles, Norway is a little larger than the state of New Mexico, or England, Ireland and Scotland combined.

The People. The tall, hardy blonds of Norway are descended from a people who originally came from the Caucasian Mountains. A short, dark race also inhabited the peninsula at an early age and the darker types are descendants of these people. The Norwegians are widely known for their honesty, simplicity and kindliness. From their brave Viking ancestors they inherit their fearlessness and love of the sea. In no other European country is society so democratic. There are no privileged classes and no orders of nobility, and in no other country are there so many great statesmen, professional men and scientists of peasant birth.

The picturesque national dress of Norway is now seen only at holiday festivals, in museums and in a few of the rural communities, and the quaint Norwegian architecture of early times survives only in the old Stav churches.

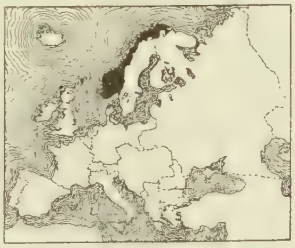
About two-thirds of the emigrants of Norwegian birth live in the Northwestern states of the American Union. The emigration from

Norway in the nineteenth century was larger proportionally than that of any other European country but Ireland, and before the War of the Nations it was the most thinly populated of all these countries. In 1910 there were 2,646,306 inhabitants, of whom 18,590 were Lapps and 7,172 were Finns. Almost three-fourths of the people live in rural communities along the coast and fiords; there are very few in the interior, and many of the high, bare mountains are wholly uninhabited. The chief cities are Christiania, the capital, Bergen, Trondhjem and Stavanger.

The Scandinavians are a religious people, and Norway has the reputation of being the most Christian and most Protestant country in the world. The Evangelical Lutheran Church is the established religious body, but all denominations enjoy freedom of worship. The most important of the organizations outside the regular Church are the Methodist and Baptist. There are also bodies of Mormons and Quakers, and about 2,000 Roman Catholics.

Language and Literature. The Norwegian dialect spoken in the west resembles the Icelandic; that of the east is more like the Swedish, and the language of the south is similar to the Danish. Dano-Norwegian, almost pure Danish, has been the business and literary language of the country since the end of the fourteenth century. A new language, called *Landsmaal,* which is based on the various Norwegian dialects, has recently spread over the country and the movement to make it the official language of Norway has had considerable success.

The literature of Norway had its beginning in the *sagas* of the *skalds,* or early bards. Remnants of these songs and poems are preserved in the *Snorra Edda* of Icelandic literature. Skaldespillir was the greatest of the Old Norse poets. During the period of union with Denmark (1380-1814) Norway had no separate literature. The first great poet of modern Norway was Henrik Wergeland (1808-1845). Asbjörnsen and Moe were responsible for the revival of the old folk songs and popular ballads in the nineteenth century.



LOCATION MAP

The length of Norway from north to south is greater than that from the North Sea to the Mediterranean.

To the later period of modern literature belong the greatest of Norwegian writers, the poet and novelist Björnstjerne Björnson, and the dramatist Henrik Ibsen, whose plays have won international fame (see IBSEN, HENRIK; BJÖRNSON, BJÖRNSTJERNE). Among other noted writers are Jonas Lie, Anna Thoresen, Camilla Collet and Alexander Kielland. Norway has been conspicuous in every field of modern literature.

Education. The people of Norway are generally well educated. Education is compulsory between the ages of six and fourteen years, and there is an excellent system of elementary and high schools. Besides these public schools, there are many communal, private, commercial, agricultural and other technical schools. There are six public and four private normal schools and a university, the Royal Frederick, at Christiania. Institutions for the deaf, blind and feeble-minded and reform schools are also maintained by the government.

The Land. Norway is a rugged table-land, the coasts of which are indented by hundreds of deep and winding fiords. Lofty, snow-covered peaks, which shelter narrow lakes, forest-clad hills and strips of green field, are numerous. Galdhöpiggen, rising 8,400 feet above the sea, is the highest mountain of the peninsula; Glittertind, in the central part of the country, is only twenty feet lower, and Store Skagastölstind rises to an elevation of 7,861 feet. The lofty plateaus, or *fjelds,* are covered with fields of deep snow, and great glaciers creep down their slopes.

The country seemingly has two floors, the upper being the rough heather-clad hills and snowy mountains, inhabited only by the hunter and herdsman, and the lower, the region of fields, forests, roads and villages.

Fiords. Norway's outer coast line is 1,700 miles in extent, but if the fringed shores of the fiords are measured, it is 12,000 miles—long enough to reach halfway around the world. *Fiord,* or *fjord,* is the Scandinavian name for any large inlet or bay, but the term is generally employed to designate deep valleys covered by the sea and bordered by high, precipitous cliffs (see FIORD). Norway's coast is a maze of these flooded canyons, which penetrate far inland. On the southern coasts these alleyways of the ocean are like long, winding lakes with many arms, but to the north they are more broken, their rock walls are more rugged and their channels deeper, many being below the floor of the ocean. The entire coast is

tasseled with numerous islands, which in the north become extremely rugged, rising from the sea like bare, rocky pyramids or towers. The Lofoten Islands form the most prominent group. Their coasts are washed by dangerous tides and the eddies of the famous Maelstrom.

Rivers and Lakes. Numerous short and rapid streams flow down the steep western mountain slopes to the sea, but Norway has few rivers of commercial importance. Among the largest streams in the east are the Glommen, which flows into the Skagerrak, and the Drammen, having its outlet in a western arm of Christiania Fiord. The most important river in the north is the Tana, forming part of the boundary with Russia and falling into the Arctic Ocean. All of the rivers are rapid, and navigation is hindered by falls and cataracts of magnificent beauty. The largest lakes include Mjösen, Randsfiord, Spirilen and Kröderen. About four per cent of the area of Norway is occupied by lakes and rivers.

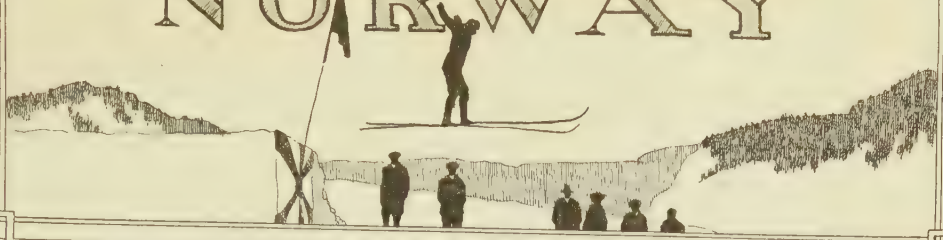
Climate. Norway extends into the Arctic Zone for about 300 miles, but the intense cold is moderated somewhat by the Atlantic winds. On the western coast the winters are mild and the summers cool, while in the interior the winters are extremely cold and the summers comparatively warm. In the north the mountains are covered with perpetual snow, and great glaciers sweep down into the valleys. Within this "Land of the Midnight Sun" of the north there are two months of winter darkness, and in the summer there is no night. In the south the winter days are short and gloomy, but the summer daylight lasts from the end of April to the middle of August. There are said to be two seasons, winter time and "tourist-time." At Christiania the mean temperature for July is 61°, and for January, 25°. The rainfall is heaviest on the west coast, where it averages from fifty to sixty inches, and the fiords and cliffs are often veiled in dense fog and mist. The precipitation on the southeast coast averages forty-eight inches, and in the interior *fjelds* it is but twelve inches.

Travel in Norway. Every summer the rocky coasts and magnificent mountains are visited by thousands of tourists, who view the midnight sun from the summit of North Cape. In normal years foreigners bring $5,000,000 into Norway each year, and many of the inhabitants find their chief source of income in the accommodation of these tourists. Many new and well-appointed hotels have been opened, and motor boats and cars have been introduced. The cariole, a small, two-wheeled car, in which the driver sits behind his single passenger and which is drawn by the sure-footed Norwegian pony, is still much used on the steep, smooth roads of the mountains. The government requires all roads to be kept in good condition and has stationed posts along the mountain routes for the comfort of tourists. The traveler in Norway never has occasion to complain of the "high cost of living," of dishonest dealing or of any lack of hospitality.

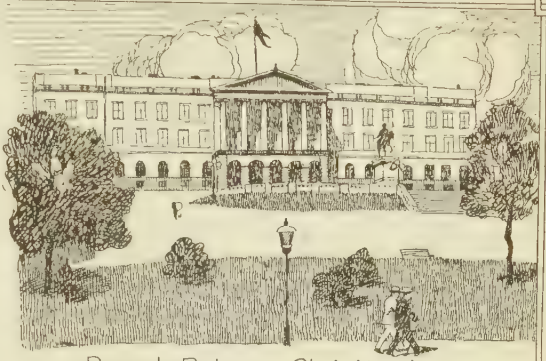
Agriculture. Although agriculture is the occupation of the larger proportion of the inhabitants, only one-thirtieth of the land has been cultivated, and over one-half of the country is bare mountain. The only arable soil is on the hillsides and in the deep valleys along the lakes and fiords, and the only extensive tracts of cultivated land are near Trondhjem in the central part of the country. Oats and potatoes are the chief crops. Barley and rye are raised in the small agricultural sections in the north, and some wheat is grown in the south. The small production of cereals falls far short of the needs of the people. Agricultural implements are generally modern, and there has been a steady increase in the number of small private farms. One-tenth of the land is in natural meadows, and the raising of live stock is an important branch of industry. About one-third of the cattle of the peninsula are raised in Norway. In the mountain pastures large herds of cows are kept during the warmer season by Norwegian women who spend the summer months in the lonely mountain huts, or *saeters*. The cattle are small, but give good milk, and the excellent Norwegian dairy products are exported in large quantities to Great Britain in normal times. The small, sure-footed fiord pony and the larger farm horse and sheep are extensively raised. The Lapps in the north keep herds of reindeer which serve them as beasts of burden and furnish food and clothing.

Forests. Over one-third of the country is timberland, and lumber and wood products constitute about one-third of Norwegian exports. The forests of the southwest are the chief source of Norway's timber, three-fourths of which is pine. Above the belt of firs which encircles the mountains are birch forests, and below, dense woods of oak, ash and maple. The state forests occupy 3,044 square miles. The Norwegian Forest Association has planted many millions of new trees, and as a result of their work, forestry has made progress.

NORWAY



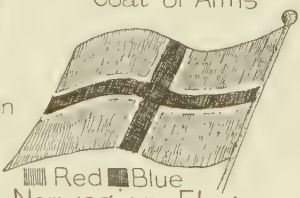
White Cap worn in Bergen



Royal Palace, Christiania

Reindeer, the Beast of Burden of Northern Norway; also provides Food and Clothing for the People

Coat of Arms



Red Blue

Norwegian Flag

An Hardanger Bride. The Crown is a Feature at all Weddings

Northernmost Structure in Norway, at North Cape

Old Viking Ship

Fisheries. The waters of the fiords, which are too deep to freeze, and the coast waters of Norway are richer in species of fish than most of the northern waters, and fishing is among the oldest and most important industries. The fishing *jagts,* boats peculiar to Norway, are being replaced by motor vessels and steamers; bank fisheries have been developed, and the coast industries have been improved and extended. A large Norwegian whaling fleet occupies the waters of the South Atlantic. The processes of preserving fish have also been improved and trade in these products has greatly increased. The cod fisheries, the largest of which are in the Lofoten Islands, are the most important and have an annual value of over $7,160,000. The herring catch is second in value, and mackerel, salmon, lobsters and sea trout are caught in large quantities.

Mining. The ore deposits are neither rich nor extensively developed. The chief mineral product is copper, but the mining of iron in the north is rapidly developing in importance. Silver is produced by the Kongsberg mines; coal is obtained in the island of Andö, and nickel and feldspar are found. Marble, building stone, slate and soapstone are important products.

Manufactures. Norway, which has been slow in industrial development, is becoming more and more a manufacturing country. With the introduction of electrical machinery, plants for the smelting of ores are increasing, and metal working and the manufacture of machinery are becoming extensive industries. Timber products, including rough lumber, furniture, wood pulp and paper, are by far the most important manufactures. Bone and horn products, pottery, china, chemicals, especially nitrate of calcium, ships, ropes and textiles are also made, but as yet Norway imports a large part of the manufactured articles used in the country.

Transportation and Commerce. There are many miles of excellent roads and about 1,920 miles of railroad in Norway. Electric traffic has been introduced. The important road between Christiania and Drammen has been electrified, and many railroads are being improved and extended by the government.

Norway is famous as a seafaring nation. Before the War of the Nations its merchant navy was the third largest mercantile marine in the world, and was larger than that of any country with an equal population. The submarine campaign, however, vastly decreased the tonnage of its merchant marine. The national commerce is small and the Norwegian vessels are extensively engaged in foreign trade. For several decades the foreign commerce has been steadily increasing. The fruit trade between South America and the United States is almost entirely carried on in Norwegian ships. The cost of imported goods exceeds the value of the national exports by $46,000,000, but this loss is offset by the profits from the foreign shipping trade. Norway's largest trade in peace times is with Great Britain and Germany, and there is normally a good deal of commerce with Denmark, Russia, America, Iceland and the Netherlands. The chief articles of export are fish, dairy and timber products, ice and ships, and the principal imports are cereals and other foodstuffs, coal, cotton and woolen goods, hides, hemp, oils and engines. Bergen, Christiania and Trondhjem are the chief ports. Christiania and Stavanger and Bergen are famous for the export of salt and canned fish.

Army and Navy. The army of Norway, like that of Switzerland, is a national militia. All men between the ages of eighteen and fifty-five are liable to service. Recruits are called to the colors when twenty-three years of age, and belong to the active army for twelve years. They then serve in the *landvärn,* or first reserve, for eight years. In 1911 the organization of the army was changed, and a second reserve, the *landstorm,* was created, which is composed of all those who have served in the regular army and in the *landvärn.* The period of service in the *landstorm* is twelve years. The total strength of the army, including the 30,000 landvärn reservists, is about 110,000 in war time.

All seafaring men between the ages of twenty-two and forty-one are liable to maritime service. The entire navy consists of about 3,400 men and sixty-two vessels, including warships, torpedo boats and submarines.

Government and History

Government. Norway is a constitutional, hereditary monarchy, but the constitution is almost as liberal as that of the United States. Both men and women citizens who have resided in the kingdom five years and are over twenty-five years of age are entitled to vote for members of Parliament, and women as well as men may sit in that body.

OUTLINE AND QUESTIONS ON NORWAY

Outline

I. Size and Location

(1) Long, narrow coast country
(2) Area
(3) Western part of Scandinavian peninsula
(4) Contains most northerly point of continental Europe

II. Physical Features

(1) Coast line
  (a) Length
  (b) Character
(2) Surface
(3) Rivers and lakes
(4) Climate
  (a) "Land of the Midnight Sun"

III. Industries and Communication

(1) Agriculture
  (a) Crops
  (b) Dairying
(2) Forestry
(3) Fishing
(4) Mining and Manufacturing
(5) Railroads
(6) Post roads
(7) Commerce

IV. The People

(1) Physical characteristics
(2) Mental and moral characteristics
(3) Tendency to emigration
(4) Language
(5) Literature
(6) Education and religion

V. Defense

(1) Army
(2) Navy

VI. Government and History

(1) Constitutional monarchy
(2) Most democratic country of Europe
(3) Early years of independence
(4) Union with Denmark
(5) Union with Sweden
(6) Independence achieved
(7) Modern progress

Questions

What are the "drowned valleys" of Norway?

What are the "cod mountains," and where are they to be found?

What is the most northerly town in the world? The most northerly point on the continent of Europe?

Who were the Vikings, and what do the modern Norwegians inherit from them?

In what way, besides from pictures, can it be known with certainty what the old Viking ships looked like?

With what justice can it be said that Norway is the most democratic country of Europe?

What country has a Norwegian population two-thirds as great as that of Norway itself?

Who were the Skalds, and what part did they play in history?

How does the length of Norway's outer coast line compare with that of a coast line which includes all the fiords? How does the latter compare with that of Africa?

Describe the famous Maelstrom.

What are the two "seasons" of Norway?

In what sort of a vehicle does the tourist make his way over the mountain roads of this country?

Where is there a great natural tunnel four hundred feet above sea level?

What does the fact that this was once at sea level prove?

How did the attitude of Denmark towards Napoleon affect Norway?

What great dramatist has the country produced? What well-known novelist?

The executive power is vested in the king and his Council of State, consisting of the Minister of State and eight councilors.

The legislative power belongs to the *Storthing,* a representative assembly of the people, which is elected every three years and meets annually. Sessions cannot last longer than three months unless authorized by the king. The Storthing is divided into two chambers, the upper, or *Lagthing,* consisting of one-fourth of the members, and the *Odelsthing,* or lower chamber, in which all bills originate. The rural communities and towns are governed by local representative bodies and councils in which the women may hold office.

There is a supreme court for the whole kingdom and there are three superior courts and 105 district courts. The *Rigeret* is the court for impeachments.

An Independent Kingdom. The monarchy of Norway was founded by Harold I, the Fairhaired, who in 872 united under his rule the several tribes of the country which had been ruled over by *jarls,* or petty chieftains. In the next two centuries Christianity was introduced by the Vikings, who in their wanderings had come in contact with Christian nations, and in the eleventh century it was made the religion of the entire country by Olaf, the patron saint of Norway. Under Haakon the Old (1217-1263), the kingdom reached the height of its power and colonies were founded by Norse explorers in Iceland and Greenland and on Shetland Island.

Loss of Independence. In 1319, there being no immediate heir to the throne, the crown was given to the king of Sweden, and since that date Norway has not had a Norwegian king. The next ruler, Haakon VI, married Queen Margaret of Denmark, who on the death of her husband and son became the sovereign of both Norway and Denmark. By the union of Kalmar, in 1397, Norway, Sweden and Denmark were united under her rule. For the next four centuries Norway was united to Denmark.

At the conclusion of the Napoleonic wars, Denmark, as a punishment for its support of Napoleon, was forced to transfer the sovereignty of Norway to Sweden, as the latter country had been loyal to the allied powers. The Norwegians refused to accept the Treaty of Kiel (January, 1814), by which the country was ceded to Sweden. They declared their independence and adopted a constitution. Although allowed to keep its own constitution, Norway was compelled to submit to the union. Throughout the nineteenth century the kingdom insisted upon its rights of independence within the boundaries, and discontent with the union increased.

The New Norway. In 1905, King Oscar's refusal to grant Norway a separate consular service brought affairs to a climax. The Storthing proclaimed the independence of the country, and to show the desire to maintain friendly relations with Sweden, the country invited King Oscar to name one of his sons as king of Norway. Upon the refusal of Oscar to accept the throne for his son, Charles, the second son of the crown prince of Denmark, was chosen as the ruler of Norway.

After the accession of Charles in 1905 as Haakon VII, democracy steadily developed. In 1909 suffrage was extended to the women paying taxes, and in 1913 all women citizens were given the vote on the same terms as men. Women also were given the right to hold positions on juries and tax commissions. Many other democratic and social reforms have been made. Workingmen's accident insurance laws have been passed and farmers' coöperative societies have been established, and there has been a remarkable reform in respect to the liquor traffic, which was ruining the country. Under the new system the profits derived from the sale of liquor are given to the state, and Norway has become one of the most temperate countries of Europe.

In the War of the Nations Norway remained neutral, but protested to the German government against the destruction of Norwegian ships by submarines. E.B.P.

Other Items of Interest. A traveler says of Hammerfest, the most northerly town in the world, "Everything is fishy. You eat fish, drink fish, smell fish and breathe fish. The bill of fare is made up of fish, the water tastes of it and the air is reeking with it."

At certain seasons the codfish crowd about the Lofoten Islands in such numbers that they pile themselves up into heaps scores of feet deep. These the fishermen call "cod mountains."

The tall, iron stoves of Norway generally have, above the "fire pot" in which the fuel is blazing, a series of compartments, which are, of course, of varying degrees of temperature. These are used for heating and drying, and the Norwegian peasant knows just which compartment is best suited for every purpose.

Norway, with Sweden, is "Mother Nature's youngest child" among the inhabited countries

of the world, for in recent geologic times it was an uninhabitable ice field, like Greenland.

The coast of Norway is bordered by no fewer than 150,000 islands. One of these, called Torghattan, has a great natural tunnel five hundred feet in length, forty feet in breadth and two hundred feet in height. It pierces a mountain, and is over four hundred feet above sea level, but in past ages it was at sea level, for the shore line of Norway and its islands is rising at the rate of about one foot in ten years.

In the days of the adventurous Northmen, each chief was placed, at his death, in the ship which he had commanded, with his armor and his treasure; and ship and Viking were buried near the seashore. Within recent years a number of these old ships, which were probably buried a thousand years ago, have been unearthed, and are on exhibition in the museums of Norway.

Consult Du Chaillu's *Land of the Long Night;* Boyesen's *Story of Norway.*

Related Subjects. The reader who is interested in Norway is referred to the following articles in these volumes:

CITIES AND TOWNS

Bergen	Stavanger
Christiania	Trondhjem
Hammerfest	

HISTORY

Denmark, subhead *History*	Northmen
	Oscar
Haakon VII	Sweden, subtitle *History*
Harold	

PRODUCTS AND INDUSTRIES

Cattle	Fish
Cod	Herring
Dairying	Lumber

UNCLASSIFIED

Edda	North Cape
Fiord	Skagerrak
Maelstrom	Skalds

NORWICH, *nawr'ich,* a city of England, noted for its textile fabrics, particularly crapes. It is situated ninety-eight miles northeast of London and is built on the slopes and summit of a hill which rises from the Wensum River. Some of the ancient gates and fortifications are still standing, and these, together with the numerous rich examples of early architecture, add picturesque charm to the otherwise busy commercial life of the city.

The beautiful Norman cathedral, founded in 1096, and famed for its noble tower and decorated spire, the second highest in England, its enormous nave and beautiful choir, is the finest of the city's churches. Castle Keep, on an elevation in the cattle market, is the only portion of the old castle still remaining; serving as a jail until 1887, it has been converted into the Norwich Museum, which has a fine collection of eagles, owls and similar birds. The famous annual cattle and sheep fair takes place in the cattle market beneath the castle. The Guild Hall still has relics of the days of Henry VIII; while in Saint Andrew's Hall, dating from the fifteenth century, the Norwich musical festivals are held. In addition to the city's textiles, mustard, starch, ornamental ironwork and boots and shoes are manufactured on an extensive scale, and there are noted nursery gardens on the outskirts. Population in 1911, 121,478.

NORWICH, *nawr'witch,* CONN., the county seat of New London County and a manufacturing city in the southeastern part of the state. At Norwich the Yantic and Shetucket rivers unite to form the Thames, which is navigable to this point. Boston is ninety-five miles northeast, and Hartford, the state capital, is fifty miles northwest. The New York, New Haven & Hartford and the Central Vermont railroads provide transportation, and electric lines radiate from the city. The place was settled in 1659 by an English company from Saybrook. Norwich was incorporated as a township in 1685, was chartered as a city in 1784 and was rechartered in 1871. It was named for the city of Norwich in England. In 1910 the population was 20,367; in 1920 it was 22,304, a gain of nearly ten per cent in the ten-year period.

Although Norwich is primarily a manufacturing center, it is a beautiful residential city, picturesquely located on rolling ground in the river valley. There are several attractive parks. The Slater Memorial, an art museum erected at a cost of $200,000; the Free Academy; the Otis Free Library; William Backus Hospital, representing a $500,000 endowment; the courthouse, Saint Patrick's Church, Masonic Temple, a state armory, a Y. M. C. A. building and the state hospital for the insane are all noteworthy structures.

Features of historic interest are the Indian burying ground, the resting place of Uncas, the Indian chief, and the homes of Christopher Leffingwell, Nathaniel Niles and the Huntingtons—Samuel, Jedediah and Jabez—all of Revolutionary fame. Branches of the Thames River furnish abundant water power, which is an important factor in the industrial life of the

city. Manufacture is represented by cotton, silk, velvet and woolen factories, firearms plants, and manufactories of furniture, woodworking machinery and iron products.

NORWOOD, Ohio, a suburb of Cincinnati, which it adjoins on the northeast, is noted for its extensive manufacture of playing cards, in which it leads the cities of the United States. It is in Hamilton County, in the extreme southwestern part of the state, and on the Baltimore & Ohio Southwestern and the Cincinnati, Lebanon & Northern railroads. Norwood was settled in 1790, was incorporated as a village in 1888 and was chartered as a city in 1902. The population increased from 16,185 in 1910 to 24,966 in 1920 (54 per cent gain). The area is three and one-half square miles.

The city is built on a hilly site of natural beauty, and a number of Cincinnati business men have their homes there. It has some large manufacturing establishments, noteworthy for their architecture and equipment as well as for their extensive output. Among these are the playing-card factory, which employs over 2,000 people, an extension bookcase factory, with about 1,200 employees, and printing and lithographing houses. There are also manufactories of plumbers' supplies, enamel signs, electrical supplies, pianos, wood products and ironworking machinery. The city hall, market house, Knights of Pythias hall, Enterprise Block and a Carnegie Library are the noteworthy buildings.

NOSE. "The nose," says one authority on physiology, "is nine-tenths for breathing and one-tenth for smelling." A study of the anatomy of this useful organ shows how admirably it has been constructed both to help one breathe and to enable one to enjoy the scents of flowers and the odors of savory foods. The air enters the nose through two openings called *nostrils,* which are separated by a thin wall or partition of gristle and bone, the *septum.* The nostrils open into the *nasal passages,* which lead back to the upper part of the throat and permit the passage of air through the pharynx and the windpipe into the lungs. Each nasal passage is lined with soft, moist mucous membrane, which is covered with fine hairs. These tiny hairs catch the dust that is breathed into the nose and prevent its passing to the lungs, and they therefore have a very important work to do. The air is also warmed as well as cleaned, for in the walls of the nasal passages are coils of minute blood vessels whose function it is to bring the air to about the temperature of the body before it enters the lungs.

The highest part of the nasal cavity is the seat of the sense of smell; it contains a small tract of mucous membrane from which are distributed the fibers of the olfactory nerve, or the nerve of smell. When the mucous membrane of the nasal passages becomes inflamed, as a result of catching cold, the sense of smell is affected because the way to the smelling center is "blocked up." It is important that the nasal passages be kept scrupulously clean, and that any inflammation of the mucous membrane be attended to at once. Neglected colds lead to catarrh, obstructions in the passages, adenoids and similar ailments.

The nose is a very prominent feature of the face, and has much to do with its physical beauty. In this connection one is reminded of the famous saying—"If the nose of Cleopatra had been shorter, the whole face of the earth would have been changed." The nose is also referred to in many familiar proverbs. Cases in point are expressions like "keeping the nose to the grindstone" or "plain as the nose on your face." In *Don Quixote* we find the knight remarking, "I never thrust my nose in other men's porridge," variants of which are very commonly heard.

Related Subjects. The reader is referred to the following articles in these volumes:

Adenoids
Breath and Breathing
Catarrh
Cold
Education, subtitle *Hygiene of Education*
Lungs
Smell

NO'TARY PUB'LIC, an officer authorized by law to attest writings, or to certify legal documents. The term is derived from the Latin word *notarius,* from *nota,* meaning a *sign,* or *mark.* In the United States notaries are commissioned by the governors of their states for four years, on petition of from fifty to one hundred duly-qualified voters, and derive their powers from the law of the state. Notaries may take acknowledgments of deeds or mortgages, administer oaths, attest affidavits and take depositions of witnesses for use in an action pending in court, and in some states they also exercise the powers of a justice of the peace. Fees are received for services, and all official acts, attested by signature and official seal, are generally received in evidence wherever they may be offered. The states which appoint women as notaries include Illinois and New York. In England and Canada the Court of Faculties appoints these officers, but in France appointments are made by the government. In the Canadian province of Saskatchewan there

are few notaries public, but the corresponding office of commissioner of oaths is very common.

NOTATION, *no ta' shun.* The manner in which numbers are written is called *notation,* and the manner of reading numbers is called *numeration.* Our method of writing numbers, using the nine digits, 1, 2, 3, 4, 5, 6, 7, 8, 9 and zero (0) has been called the Arabic notation because the people of Europe got it from the Arabians. But we know that the Arabians never laid claim to the invention, but always acknowledged it as the work of the Hindus. To the Hindus we owe the symbols and the *place value* feature which plays so large a part in all computations.

In a cave on the top of the hill of Mana Ghat in Central India the symbols were found without the zero about 300 B.C. The zero appeared about eight centuries later, and in the ninth century A.D. it occurs in an inscription in India. So our so-called "Arabic notation" is the Hindu notation. Leonardo of Pisa (1200) did much to forward the use of the Hindu notation in Europe, but it took about two centuries after his time for it to gain a foothold. In 1350 we find "zero" in manuscript, and in 1491 we find it in print. The Arabic displaced the Roman notation after a long struggle.

Roman Notation. The Roman notation expresses numbers by means of capital letters; as, I, V, X, C, M. We still retain it in numbering chapters of books, volumes of books, hours on clocks and in artistic numbering. The following are the letters used and the value they represent:

I represents one
V represents five
X represents ten
L represents fifty
C represents one hundred
D represents five hundred
M represents one thousand

(1) By placing a letter denoting a smaller number in front of one denoting a larger number, the value of the larger number is decreased; as, I in front of X, IX, denotes *ten less one* or 9.

(2) When a letter denoting smaller value is placed after a letter denoting greater value, the greater value is increased, as, II placed after X, XII, denotes *ten plus two* or 12.

(3) A letter repeated denotes the value repeated, as, XXX is 30, CC is 200.

(4) Placing a horizontal line over a letter multiplies its value by 1000, as $\overline{C}$ denotes 100,000.

Hindu Notation. This notation expresses numbers by the use of ten symbols (nine digits and zero). Because of the *place value* feature of this system, we are able to represent our great *series* of numbers with these few symbols:

In the expression 222, the first 2 on the right is 2 ones, the next 2 is 2 tens or 20 ones, the next 2 is 2 hundreds or 200 ones. Thus any symbol may express various number values, the value depending upon the *place* the symbol occupies; that is, each symbol has a value indicated by its *name* and a value dependent upon its *place* in the number. This latter value is called its *place value.* Zero is used to designate the absence of any *significant* symbol in a *place;* for example, three thousand four is written 3004, the zeros indicating the absence of hundreds and tens.

Digits. The *significant* symbols are called *digits,* also figures; thus, the number six thousand, four hundred, fifty-two, is expressed by the digits or figures, 6, 4, 5 and 2.

Orders of Units. The successive places in a number are called *orders of units.* The orders increase from right to left in a tenfold ratio; the first order is units, the second tens, the third hundreds, and so on. In other words, our Hindu notation is a decimal notation, *decimal* from the Latin *decem,* meaning *ten.*

Periods. The figures of a number are grouped in *periods* of three figures each; the first period is called units' period; the second thousands' period; the third millions' period; the fourth billions' period; the fifth trillions' period, and above that quadrillions, quintillions, sextillions, septillions, octillions, and so on. 486,392,574,692,875 reads 486 trillions, 392 billions, 574 millions, 692 thousands, 875. The name *units* is never read after the number of units.

History of Notation. The various tribes and nations of the earth have had their own systems of expressing number. The important point of distinction among the systems is the *base* of each system. Among some low tribes the base is 2, and they count 1, 2, 2 and 1, 2 and 2; others have the base 3 and so count 1, 2, 3, 3 and 1, 3 and 2, 3 and 3; many tribes have the base 5 (from the fingers on one hand).

The Hebrews used the base 10, the decimal base (from fingers on both hands). In the valleys of the Tigris and Euphrates, 60 is found as a base, 100 appearing as 60 and 40. This base may be due to their knowledge of a circle; they divided the circle into 360 equal parts or degrees. They knew also that the radius of a

circle fits into the circumferences as a chord 6 times. It is thought that the arc of this chord, ⅙ of 360° or 60°, gave the base 60 for their number expression. Among many early people of Western Europe is found the base 20 (from the number of fingers and toes). When they reached 20 in count, they *scored* by a mark on the earth, or a cut in wood, or by some manner of mark that would hold the number. We find the *score* 20 common in Ireland and Wales. The bases 2, 5, and so on, proved too small; the 60 and 20 proved too large, and the *decimal base* 10 has survived. See ADDITION. A.H.

NOTE, or **PROMISSORY,** *prom'i so ri,* **NOTE.** Arnold Shaw is a retail merchant having a good business and a good financial standing. He needed $500 worth of merchandise, but did not have the money in hand to pay for it. He knew, however, that he had accounts becoming due within sixty days that would enable him to pay for the goods at the end of that time, so he went to Henry Brown, a wholesale merchant, who sold him the goods and took his note, payable in sixty days. The note was as follows:

$500. San Francisco, Cal., August 1, 1917.

Sixty days after date I promise to pay to the order of Henry Brown five hundred dollars, with interest at six per cent per annum. Value received.

ARNOLD SHAW.

A promissory note, of which the above is an example, is a written promise to pay a specified sum at a given date. The one who signs the note is called the *maker;* the one to whom it is made payable is the *payee.*

A note is *negotiable* when it is made payable to bearer or order, like the note given above. If Brown needs the money before the expiration of the sixty days he can endorse Shaw's note by writing his name on the back and have it discounted at the bank. Then Shaw will pay the bank when his note becomes due. In order that a note may be negotiable it must meet the following requirements:

1. It must be made payable *to bearer or to order.* A promise to pay A. B. is not negotiable. A note payable to bearer is transferable without endorsement.

2. The promise to pay must be unconditional. "I promise to pay A. B. $100 when I sell my wheat" is not negotiable.

3. It must be payable in money. A note payable in goods, and commonly called a *chattel note,* is not negotiable.

4. The amount must be definite; that is, the precise amount of money must be stated.

5. It must be given by one legally qualified to make a note.

Liability of Maker. When a note has been transferred by endorsement, the person in possession of it is known as the *holder.* He can transfer it to another by adding his endorsement and so on indefinitely. The holder of the note, when it falls due, looks to the maker for payment, and the law protects the holder under practically all conditions, including fraud of the payee. A was the agent for a washing machine. He showed the machine to B and secured B's signature to what appeared to be a recommendation of it. A made the recommendation into a note for $100, which he sold to the local bank. B had to pay the note.

In case the maker fails to pay the note when it falls due, the endorser is liable. In order to hold him he is served with a notice signed by a notary public (which see) and called a *protest.* In case there is more than one endorser a protest is sent to each.

Days of Grace. Formerly the maker was allowed a specified time, usually three days, in which to meet his note after it fell due, but in most states this privilege has been withdrawn. See GRACE, DAYS OF.

Caution. A negotiable note stands in the place of money and is often used as money. As the law holds the maker responsible for his signature, one should never sign a document without first understanding fully the obligations which his signature will require him to discharge. W.F.R.

Consult Bigelow's *Cases on Law of Bills, Notes and Cheques.*

NOTRE DAME, *no'tr' dam,* CATHEDRAL OF. The term *Notre Dame* is French, and means *Our Lady.* The name is given to the most famous cathedral of Paris, built on an island in the Seine River in the heart of the city. It has been the scene of some of the great historic events of the country. There Napoleon was crowned ruler of France, and Mary Queen of Scots was married to the Dauphin. The story of the cathedral is the theme of much of the literature and art of France. Several churches stood in the same place, the first one built so long ago the date is not known. As each crumbled or was destroyed, it was replaced by another. The present building was begun in 1163, but was not finished as it is to-day until the first of the nineteenth century. The style of architecture is Gothic. The famous gargoyles of the building serve the purpose of spouts to gather the rain water and keep it from stain-

ing the walls. They were made in the shapes of ugly birds and beasts to represent the evil spirits denied entrance to the building (see GARGOYLE). See, also, CATHEDRAL.

NOTRE DAME
The two great towers were to have been surmounted by lofty spires, but these never were added.

NOTRE DAME, UNIVERSITY OF, one of the most important Roman Catholic schools in the United States, located at Notre Dame, Ind., about two miles from South Bend. It was founded in 1842 by the head of the Congregation of the Holy Cross, which controls the school, and in 1844 was granted a charter by the state legislature. For a few years the university consisted of only a college of arts and letters. There have since been added colleges of science, engineering, architecture and law, and a preparatory school. Military drill is required of all students except the college juniors and seniors.

The University Press issues a religious and literary periodical, *The Ave Maria,* to which many noted writers contribute. Each year the university awards the Laetare medal to a Roman Catholic layman who has distinguished himself in some branch of learning. The student body, among whom are many Latin-Americans, numbers about 1,700. There are ninety instructors. The university library contains 85,000 volumes.

NOTTINGHAM, *not'ing am,* a manufacturing city in Northern England, at the junction of the River Leen and the Trent, 125 miles northwest of London, by rail. It is the county town of Nottinghamshire. The city has been famed for its spinning and knitting industries for over six centuries. Its oldest charter, dated 1155, confirms the manufacturing privileges granted it by former kings. In 1769 Richard Arkwright erected in Nottingham his first spinning frame, and the city became an important center for cotton, silk and merino hosiery. It was noted, too, for a beautiful point lace made by hand. Then came John Heathcoat and his machine for making bobbinet, an invention that revolutionized the lace industry. Instead of producing a small quantity of very fine lace made by hand, the city employs thousands of women to embroider lace designs upon a machine-made background.

Since the time of Heathcoat (1810) many machines have been invented which make imitations so perfect that the position of each thread is absolutely identical with the corresponding thread of the handmade article. Though all kinds and qualities of lace are manufactured, *Nottingham* is usually applied to a coarse, simple-meshed lace with large, elaborate designs. Besides the lace and hosiery industries there are large bicycle works, brass and iron foundries and bleaching works, and the city is a considerable market for coal from the mines near by. Nottingham has numerous schools, hospitals, parks, charitable institutions and churches, and is the only municipality in England that maintains a college.

The name of the city comes from the old Saxon *Snottengaham,* meaning *home of the caves,* and was applied to the place because some of the caves near by had been used as places of refuge during the Danish invasion. Soon after the Danes were expelled the country was taken by William the Conqueror; he built Nottingham Castle and made the town one of considerable importance. In the castle many famous Parliaments were held, and Isabella and Mortimer were captured there in 1330. Charles I raised his standard there, beginning the civil war that was to end so disastrously for him. It was dismantled by order of Cromwell in 1644, and though rebuilt during the Restoration, was nearly destroyed during the Reform Bill riots of 1831. Nottingham is the scene of many of the adventures of Robin Hood, and his beloved Sherwood Forest, now denuded of its trees, is fast becoming a fashionable residence district. Population in 1921, 262,658.

NOUN. As a short definition for the part of speech known as the *noun,* we might call it a *name-word,* standing for some object, substance or idea. *Noun* comes, in fact, from the Latin word for *name—nomen,* the same root

which gives us *nominate*, to name for an office, and *nomenclature*, a system of naming.

Classes of Nouns. The two great classes into which all nouns are divided are *common nouns* and *proper nouns*.

The words *king, pirate, canal, boy, city, tribe,* are called common nouns because each of them is a general name indicating a large class of things. *Common* here has the meaning of *belonging to all.* If we single out a special object, place or thing in each of these classes and give it a name that sets it apart from the rest, such a name will be a proper noun; as, *Charlemagne, Captain Kidd, Panama Canal, Robert, Quebec, Algonquins.* Used in this sense, *proper* has the old Latin meaning of *one's own.* All proper nouns are capitalized.

Sometimes the name of an individual is used to signify an entire class possessing that person's dominant characteristics; as, What adventurous boy does not dream of some day growing up to be a *Captain Kidd?* In our schools to-day we are educating the *Lincolns,* the *Edisons,* the *Jane Addamses* of to-morrow. In these cases, what was originally a proper noun is changed by its use to a common noun.

Concrete and Abstract Nouns. Common nouns are subdivided into three classes—concrete, abstract and collective.

A *concrete* or *class noun* is the ordinary common noun, naming a class of objects tangible to the senses—things we can see and handle. Words like *bell, book, candle, football, friend, lake, muscle, oil,* are all concrete nouns.

An *abstract noun,* on the other hand, does not refer to any particular person or thing, but names some quality, action or state considered in a detached way. For instance, the words *blueness* and *vastness* are abstract nouns, representing simply the ideas of color and extent "in the abstract," divorced from any particular object. Words like *darkness, light, cold, beauty, sourness, comfort, freedom, space, depth, silence, sorrow, knowledge, childhood, youth,* and the names of the virtues and vices—*patience, truthfulness, indolence,* and the like—all belong to the class of abstract nouns. All verbals, or nouns formed from verbs, classify as abstract: *jump, judgment, invention, saying, fishing, beginning, feelings.*

Collective Nouns. The third subclass of common nouns covers those which, though singular in form, signify a group of things or persons; as, *swarm, flock, crowd, class, family, audience.* These are called *collective nouns.* If the group is considered as a unit, the noun is treated grammatically as singular; but if some statement is made which requires us to think of the individuals or objects separately, the noun is treated as plural. For example: The regiment *has* just passed on *its* way to the front; on *their* return the regiment *were* escorted to *their* homes by enthusiastic townspeople.

Nouns by Use. Any word belonging to any part of speech, as well as any figure, letter or symbol, may be used as a noun. For example: The *poor,* says Emerson, are only they who feel poor; *"for"* is all too frequently mispronounced "fer;" your *"certainly"* has an odd sound; *Z* is the last letter of the English alphabet; finally the *S. O. S.* was sent; his *7's* can scarcely be told from his *1's.* Sometimes an entire phrase or clause may serve as a noun: *To visit an observatory* is a most interesting experience; *that he had forgotten the meeting* was evident. These are parsed as adjectives, adverbs, clauses and the like, used *substantively*—that is, as nouns.

Properties of Nouns. *Person.* There are three persons: *First person* is that property by which the speaker is indicated: I, *Margaret Miller,* the *undersigned,* do give and bequeath. *Second person* is that property which denotes the person or personified object spoken to: *Margaret,* some one is calling you. *Third person* is that property which indicates the person or thing spoken of: They have chosen my cousin *Margaret.* Most nouns are third person nouns. See PERSON.

Number. There are two numbers: *Singular number* denotes the idea of one: the *pear,* an *apple,* one *melon. Plural number* denotes more than one: the *pears,* a dozen *apples,* a basket of *melons.* See NUMBER.

Gender. There are three genders: *Masculine gender* belongs to nouns denoting the male sex: *lad, drake, emperor. Feminine gender* belongs to nouns denoting the female sex: *maid, duck, empress. Neuter gender* belongs to nouns denoting inanimate, sexless objects: *fan, clothes, marble. Common* or *indeterminate gender* refers to either sex: *child, teacher, servant.* See GENDER.

Case. There are four cases: *Nominative case* is that grammatical relation of a noun in which it is the subject of a verb, the predicate noun or complement, in apposition with another nominative, nominative by direct address or exclamation, or an independent nominative, used absolutely with a participle or with an infinitive in exclamation. *Objective case,*

also called the *accusative,* is that grammatical relation of a noun in which it serves as the direct or indirect object of a verb, the second object or predicate objective of a verb, the object of a preposition or the subject of an infinitive, or in which it is in apposition with another noun in the objective case. When used as the indirect object the word is said to be in the *dative* case. *Possessive case,* or *genitive,* is that grammatical relation of a noun by which it denotes ownership.

Parsing the Noun. To parse a noun these points must be covered: The class to which it belongs; its number, person, gender and case; its syntax, or use in the sentence. The following is a type sentence:

> Rose, thou art the fondest child
> Of dimpled Spring, the wood-nymph wild.
> —*Moore.*

Rose is a common noun, personified; singular number, second person, neuter gender, nominative case—by direct address. *Child* is a common noun; singular number, third person, common or indeterminate gender, nominative case—predicate complement of the verb *art. Spring* is a proper noun, personified; singular number, third person, feminine gender, objective case—object of the preposition *of. Wood-nymph* is a common noun, compound in form; singular number, third person, feminine gender, objective case—in apposition with *Spring.*

Common Errors. The chief sources of error in the use of nouns are the employment of the objective instead of the possessive case preceding a participle used as a noun, the incorrect formation of plurals and possessives, and the misuse of everyday words, like *party, line* and *balance,* in constructions where the meaning calls for some other noun. Some of the commonest of these errors are covered in the following examples:

Use three heaping spoons full of sugar, for *Use three heaping spoonfuls of sugar.* It is the last word that should be pluralized, since the idea is not three separate spoons, but a single spoonful taken three times.

My mother and two of my sister-in-laws will accompany me, for *My mother and two of my sisters-in-law will accompany me. Sister* is the important word in the compound and therefore the one to be pluralized; the other words are merely descriptive.

The family dates back to William's and Mary's reign, for *The family dates back to William and Mary's reign,* or, still better, *to the reign of William and Mary.* Possessive nouns connected by *and* but denoting joint possession require only one sign of the possessive, and that should be affixed to the last word of the series.

I can find mother and sister's umbrellas, but not yours, for *I can find mother's and sister's umbrellas, but not yours.* Here the idea of separate ownership is implied, and therefore each noun must be in the possessive case.

Next week there will be an important sale of ladie's and childrens' clothing, for *Next week there will be an important sale of ladies' and children's clothing.* In forming the plural possessive the apostrophe follows the *s* if the plural ends in *s;* it precedes the *s* where the plural is irregularly formed, as in the case of *children.*

These flowers came from Johnson's, the florist's, for *These flowers came from Johnson, the florist's.* With two nouns in apposition, it is correct to put the sign of the possessive with the second only—never with both.

The balance of the time I spent in reading, for *The remainder* (or *rest*) *of the time I spent in reading. Balance* is a commercial term, improperly used except with the idea of making things equal.

Only a dozen or so people attended the meeting, for *Only a dozen or so persons attended the meeting. People* is not correctly used for a small number of persons.

I live a long ways from New York, for *I live a long way* (or *distance*) *from New York.* The combination of the singular article *a* with a plural noun is illogical.

We have a fine line of outing shoes, for *We have a fine stock of outing shoes.* The use of *line* in this sense is an example of "trade jargon." *Line of work* and *line of business* are good English expressions, but not *line of goods.*

Are you the party who was to look after these repairs? for *Are you the man* (or *person*) *who was to look after these repairs?* It is only in legal phrases, such as *party to the crime, party of the first part, party to the suit,* and the like, that *party* may be used for only one person; in all other cases it signifies a number of persons.

You had a right to warn him, for *You ought to have warned him,* or *It was your duty to warn him.* The noun *right* is not properly used to express the idea of obligation or duty.

There are more than thirty scholars in my arithmetic class, for *There are more than thirty pupils* (or *students*) *in my arithmetic class.* A scholar is a learned person, a man or woman of scholarly attainments, not a mere learner. L.M.B.

Outline on the Noun

(1) Definition
  (a) Derivation of noun
  (b) Meaning in grammar
(2) Classes
  (a) Common
    1. Concrete
    2. Abstract
    3. Collective
    4. Nouns by use
  (b) Proper
  (c) Proper used as common
(3) Properties
  (a) Person
  (b) Number
  (c) Gender
  (d) Case
(4) Parsing the noun
  (a) Essentials to be stated
  (b) Type sentence
(5) Common Errors

NOVA SCOTIA, *sko'shi a,* or **NEW SCOTLAND,** is the southeastern province of the Dominion of Canada. It is the old *Acadie* of the French and the land of *Evangeline.* Because of its location Nova Scotia has aptly been called "the doorstep of a continent." With New Brunswick and Prince Edward Island it constitutes the group known as the *Maritime Provinces* and now also as the *Atlantic Provinces.* It includes the peninsula of Nova Scotia and Cape Breton Island; the peninsula is joined to New Brunswick by an isthmus twelve miles wide. On the north it is bounded by the Bay of Fundy, New Brunswick, Northumberland Strait and the Gulf of Saint Lawrence. The Atlantic Ocean touches it on the east, south and west. Including Cape Breton Island the province is 370 miles long and from fifty to 100 miles wide, with an average width of sixty-five miles. The coast line is 1,000 miles long, and the area is 21,428 square miles, or equal to two-thirds the area of Scotland. Nova Scotia is a little larger than New Hampshire and Vermont combined. If laid along the coast of the New England states it would extend from the eastern point of Maine to Long Island Sound.

The People. The early settlers came from France and from Scotland, and when the English colonies in America waged their war for independence many loyalists emigrated from there to Nova Scotia. The present population consists of descendants from these early families and English families who came to the province at a later date. Cape Breton and the eastern part of the peninsula are Scotch, and French-Acadians are found in the extreme west —Digby and Yarmouth counties—and, in the east, in Richmond and Inverness counties. There is a German settlement in the center, and the remainder of the population is English, with a sprinkling of Micmac Indians, who were the original inhabitants. The people of Nova Scotia are known far and wide for their high degree of intelligence, their integrity, industry and thrift. In proportion to her population, Nova Scotia has been the birthplace of a larger number of men who have won distinction as statesmen, military leaders, writers and educators than any other province in the Dominion.

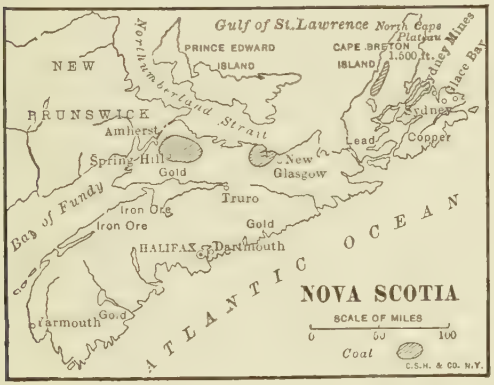
LOCATION MAP
The position of Nova Scotia with reference to the remainder of British North America.

The number of inhabitants of the province was 523,837 in 1921, an average of 24.4 to the square mile.

Surface and Drainage. The surface is characterized by low hills and shallow valleys. Three ranges of hills extend through the province from southwest to northeast, their direction showing them to be a part of the Appalachian system. One of these ranges extends along the center of the peninsula. Another, known as the North Mountains, borders the Bay of Fundy, and the third, or Cobequid Mountains, extends along the northern shore of Minas basin and terminates towards the Strait of Canso. Some summits of this range attain an altitude of 1,000 feet. The main part of the province is an undulating plateau with an altitude of about 400 feet in the southwest and rising to nearly 1,000 feet in Cape Breton. One point, North Cape Plateau, is 1,500 feet high. A number of bold headlands appear along the coast, but there are no high altitudes. The northwest coast is deeply indented; the Atlantic coast contains a number of inlets suitable for good harbors, the most important being Halifax Harbor, Chester Basin and Chedabucto Bay.

No point within the peninsula is over thirty-five miles from the sea, consequently the rivers are short and small, seldom exceeding fifty miles in length. The most important are the Annapolis, flowing to Annapolis Basin, and the Shubenacadie, rising near Halifax and flowing northward into Minas Basin. There are over 400 small lakes in the peninsula, the largest being Lake Rossignol in Queens County. Lake Bras d'Or in Cape Breton has an area equal to one-sixth the area of the island. Most of these lakes are surrounded by woodland, and they form a charming feature of the landscape.

Climate. Nova Scotia has the same latitude as Maine and the northern part of New Hampshire, Vermont and New York, but owing to the influence of the ocean it has a milder and more even climate than the northern part of the New England states. The winters are free from severe weather, and the summers from extreme heat, the mean temperature for the winter being 27° F. and for the summer 65°. The annual rainfall, including snow, is 45.6 inches. The regions along the coast are subject



OUTLINE MAP OF NOVA SCOTIA
Showing boundaries, principal cities, waterways, mineral deposits, coal measures, and the highest point of land.

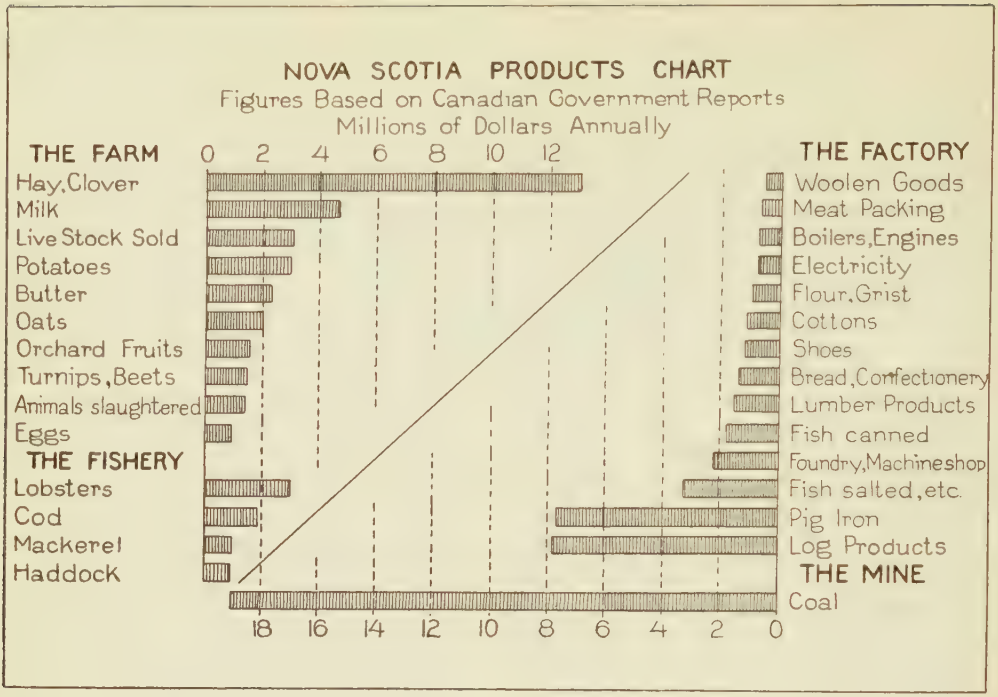
to heavy fogs. The climate is so healthful and delightful that Nova Scotia has become a favorite summer resort for the residents of Boston, New York and other coast cities of the United States.

Plants and Animals. Originally Nova Scotia was covered with forests in which hard and soft woods were about equally represented, and these forests are still found in land that has not been cleared for tillage or for lumber. The oak, maple and birch are common among the hard woods, and the hemlock, spruce and tamarack among the soft woods. Shrubs and wild flowers common to the Eastern Townships of Quebec and the Northern New England states are common here. The woods are filled with violets; so abundant is the trailing arbutus, or Mayflower, that it has given to Nova Scotia its motto, "We bloom amid the snows." In summer the lakes and marshes are covered with water lilies that fill the air with fragrance. Moose, rabbits and partridge are found in the less densely populated regions, and occasionally the sportsman may add a wildcat or a bear to his trophies. The lakes and streams abound in fish, and are frequented by fishermen in summer. Fox farming is becoming a paying industry.

Minerals and Mining. The coal fields of Nova Scotia have an area about equal to that of the state of Rhode Island. The coal is the bituminous variety and is of excellent quality. Eleven mines are in operation, five in Cape Breton and six in the peninsula. The output was worth fully $31,200,000 in 1921; nearly two-thirds was exported to the United States, the remainder going to the neighboring provinces. Nova Scotia produces more coal than all the other provinces of the Dominion. Iron ore occurs in every county but one, but the largest deposits are in the district bordering on the Bay of Fundy and in Cumberland, Colchester, Pictou and Antigonish counties. Gold is found in paying quantities in various places along the Atlantic coast, and it is claimed that the gold fields have an area of 3,000 square miles. The yearly output amounts to about $140,000. Gypsum and manganese are found in paying quantities, but they are not yet extensively mined.

Fisheries. The Nova Scotia fisheries are the most extensive in the Dominion, excepting those in British Columbia. Both bank or inshore and deep-sea fishing are carried on. The most important catches are cod, lobsters, mackerel, herring and haddock. Salmon are taken in paying quantities off shore and in the rivers. The industry gives employment to about 30,000 men, and the catch in 1921 amounted to $12,600,000. Most of the fish and fish products are exported to Great Britain. Nova Scotia has twelve fish hatcheries maintained by the government, and the industry receives an annual subsidy of $400,000 from the Dominion.

Forests and Lumbering. There are over 7,000 square miles of forests in the province, and lumbering is one of the important industries. The pine has been exhausted, but spruce, hemlock, fir and hard woods are still plentiful. Over 200,000,000 board feet are exported yearly to the United States, Great Britain, South America



and the West Indies. The industry is located in the western part of the province.

Agriculture. The soil in the valleys is very fertile, and in places along the coast of the Bay of Fundy and Minas Basin salt marshes were reclaimed by the first settlers, and the soil is especially suited to raising hay and fodder. The preparation of these meadows is aptly described by Longfellow:

> Dikes, that the hands of the farmers had raised with labor incessant,
> Shut out the turbulent tides; but at stated seasons the flood-gates
> Opened, and welcomed the sea to wander at will o'er the meadows.

Throughout the province hay and fodder crops are among the most important agricultural products. Potatoes and root crops are also valuable, and oats, wheat, buckwheat and barley are the most important grain crops. The yield per acre is equal to that in any other section of North America.

Live stock and dairying are receiving increased attention. The climate and soil are especially adapted to making butter and cheese, and these products are increasing from year to year. There are but few creameries, and most of the butter and cheese is made on the farms. Horses, sheep and swine are found on practically all of the farms.

Nova Scotia is especially adapted to the growing of apples, and there are fine orchards in the Annapolis Valley. Over 600,000 barrels are exported annually. Cherries, cranberries, plums and small fruits are also successfully grown, most of the crop being canned for shipment.

The agricultural college at Truro maintains both long and short courses and also does extension work throughout the province. This school is organized and conducted on the same plan as that at Guelph, Ont. It has students from all the Maritime Provinces, and it is exerting a strong influence towards more scientific methods in agriculture. An experimental farm of 400 acres is connected with the college.

Manufactures. The manufacture of iron and steel is increasing from year to year and will soon become extensive, since Nova Scotia possesses all the natural advantages for its development—coal that makes excellent coke, iron ore and limestone for making flux near at hand and other deposits on Great Belle Isle near Newfoundland. Moreover, it is most advantageously located for shipping the products to all parts of the world. Large blast furnaces are in operation at Sydney, New Glasgow and Londonderry. Hemlock bark is easily obtained, and tanneries are found in various parts of the province. Some cotton and woolen goods are made,

RESEARCH QUESTIONS ON NOVA SCOTIA

(An Outline suitable for Nova Scotia will be found with the article "Province.")

Why would not the following lines be as true now as when they were written?

> This is the forest primeval. The murmuring *pines* and the hemlocks—
> Stand like Druids of eld, with voices sad and prophetic.

What poem has done more than any other one thing to create a knowledge of and an interest in Nova Scotia?

What is the oldest settlement established by white men in British North America?

What was its original name? In whose honor was the change made? How many inhabitants has it now?

Turn to the map of Canada, and show the appropriateness of calling Nova Scotia "the doorstep of a continent."

How long would a canal have to be which would make of Nova Scotia an island? In what direction would it run?

What fortress was considered during the eighteenth century the strongest fortification in America? Describe the sieges it endured.

For what is the bay that separates the southern part of Nova Scotia from New Brunswick chiefly noted?

How does the coast line compare in length with that of California? How do the areas of the two compare? The populations?

How does its population compare with the combined populations of the two states of the American union which it most nearly resembles in area?

When did many people remove to this region from territory which is now a part of the United States? Why?

What is the greatest distance of any point in the province from the sea? What effect does this have on the length of the rivers?

How has the province dealt with the liquor question?

What was the attitude of Nova Scotia toward the question of confederation?

Who was Joseph Howe, and what does the province owe to him?

Who were the original inhabitants of this region?

What does the name Nova Scotia mean, and why was it bestowed on this region? What had the name been previously?

What does the name of Cape Breton's largest lake mean? Why was it bestowed on this body of water?

If Manitoba had a lake as large in proportion to the area of the province as this lake is in proportion to that of Cape Breton Island, what would the area be?

Why has this province a milder climate than many regions farther south?

What is the motto of Nova Scotia, and what suggested it?

What curious branch of "animal farming" is becoming popular?

What ratio does the area of Nova Scotia bear to that of the country for which it was named?

What important substances does the United States import in considerable quantities from this province?

What does the government do to help the farmer?

Is Sydney nearer Liverpool or farther from it than is the chief port of the United States? How much?

Of how many houses does the provincial legislature consist? How many Canadian provinces resemble Nova Scotia in this?

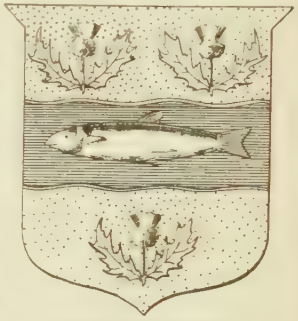
and lumber and wood pulp are manufactured in the western part of the province. The streams furnish an abundance of water power.

Transportation and Commerce. The extensive coast line with numerous good harbor sites gives Nova Scotia special advantages for shipping her products. Moreover, she is nearer Europe and South America than most of the Atlantic seaports in the United States. Sydney is 800 miles nearer Liverpool than is New York. The harbors on the Atlantic coast and the Bay of Fundy are open throughout the year. There are about 1,400 miles of railway in the province. A line extends from Halifax along the coast around the western part of the peninsula. Another line extends northeasterly from Halifax and connects with a line bordering Northumberland Strait and extending into Cape Breton. A branch of this line makes connection at Moncton, N. B., with all important lines in that province. The chief exports are fish, lumber, coal, iron and steel and agricultural products. The imports consist of manufactured goods, especially textiles and clothing. Most of the foreign trade is with Great Britain and the United States.

Education. For educational purposes the provincial cabinet constitutes the Educational Council, which with a superintendent of education is at the head of the public school system. The schools are free and undenominational. About one-fifth of their support is derived from a provincial fund, and the balance from local taxation. A strict compulsory education law is in force throughout the province. Besides the agricultural college at Truro there is the Nova Scotia Technical College at Halifax with branches in all industrial centers. The Provincial Normal College is at Truro, and at Halifax is the Halifax Ladies' College and Conservatory of Music, and the Victoria School of Art and Design. Among the leading denominational institutions are the University of Saint Francis Xavier College at Antigonish, Acadia University (which see) at Wolfville, King's College at Windsor, and the Presbyterian College at Halifax. Dalhousie University (which see) also at Halifax, is undenominational, and is the leading university of the Maritime Provinces.

Government. The chief executive is a lieutenant-governor who is appointed by the governor-general of the Dominion in council. He is assisted by a cabinet of seven members. The legislature consists of a legislative council of twenty-one members appointed for life by the lieutenant-governor in council, and a house or assembly of forty-three members, elected by the voters of the counties and cities. The chief executive is the premier, who is at the head of the governor's cabinet. The affairs of each county are managed by a county council elected by the people. Money cannot be borrowed without the sanction of the people. The judges of the courts are appointed by the Dominion government for life.

History. In 1497 Cabot (which see) landed on Cape Breton Island, and it is supposed that the Portuguese navigator Cortereal explored the coast in 1500. Verrazano, Cartier and other French explorers learned of the country early in the sixteenth century, and French fishermen frequented the waters off the coast during this time. The actual history of the province, however, began in 1604, when the first settlement was made on the island of Saint Croix by Sieur de Monts, Champlain and others. This settlement, removed the following year to Port Royal, is the oldest settlement by white men in British North America (see Annapolis Royal). The territory comprising New Brunswick and Nova Scotia was granted de Monts under the name of *Acadie* (see Acadia). While the country remained in possession of France, Annapolis Royal was the chief center of French influence. During the French occupation the New England colonists made a number of attempts to gain possession of the country. In 1621 Sir William Alexander obtained from James I a grant of the entire territory of Acadia, which he renamed *Nova Scotia,* the Latin for New Scotland. In 1628 Port Royal was captured by Sir David Kirk of England, but in 1632 the province was restored to France. In 1654 the English again obtained possession, but lost it in the treaty of Breda three years later. For the next forty years and more the French were left in undisputed possession of the country, then in 1710 Port Royal was taken by Col. Francis Nicholson and the Treaty of Utrecht gave the territory to Great Britain. The fortress of Louisburg on Cape Breton, which was considered the strongest fortification in America, was captured by the English in 1745 and in 1758.



COAT OF ARMS

The great tragedy in the history of Nova Scotia was the deportation of the Acadians in 1755 and their distribution among the English colonies to the south (see ACADIA).

Scattered were they like flakes of snow, when the wind from the northeast
Strikes aslant through the fogs that darken the Banks of Newfoundland.

Whatever the necessity for this act may have been, it has led to many sharp discussions for and against it. Some justify the act on the ground that the Acadians, by refusing to take the oath of allegiance to the British government, were menacing the peace of the province. Those on the other side claim that the Acadians were farmers who remained on their land and took no part in the political affairs of the colony, and that they were in no case a menace to the government. Be this as it may, the event led years afterwards to the writing of the poem *Evangeline* by Longfellow, which has done more than all things else to make Nova Scotia known to the world.

In 1758, a constitution providing for an elective assembly was granted, and Cape Breton Island and Prince Edward Island joined Nova Scotia in 1763, but in 1770 Prince Edward Island was separated from the province. In 1773 Scottish immigration began, and following the Revolutionary War in the United States, the province received a large number of loyalists from that country. In 1754 New Brunswick and Cape Breton were separated from Nova Scotia, but in 1820 Cape Breton was again annexed. Like the provinces of Upper and Lower Canada, Nova Scotia had a prolonged struggle to obtain a responsible government, but in 1848 this was attained under the leadership of Joseph Howe. In 1867 Nova Scotia decided to become a member of the Dominion. Since that time the energies of her statesmen have been devoted to the development of the resources of the province, the perfection of her laws and raising the standard of education. In 1910 a law prohibiting the sale of intoxicating liquors throughout the province, except in the city of Halifax, was passed. In 1916 the law was extended to the whole Province. A.H.M.

Consult Willson's *Nova Scotia, the Province That Has Been Passed By.*

Related Subjects. The reader who is interested in Nova Scotia will find much that is helpful in the following articles:

CITIES AND TOWNS

Amherst
Annapolis Royal
Antigonish
Bridgewater
Dartmouth
Dominion
Grand-Pré
Halifax
Inverness
Kentville
Liverpool
Lunenburg
New Glasgow
North Sydney
Parrsboro
Pictou
Spring Hill
Stellarton
Sydney
Truro
Westville
Windsor
Yarmouth

HISTORY

Acadia
Cabot, John
Evangeline
Howe, Joseph
Louisburg

LEADING PRODUCTS

Apple
Coal
Cod
Fish
Hay
Iron
Lobster
Lumber
Mackerel

UNCLASSIFIED

Fundy, Bay of
Bras d'Or Lake
Cape Breton Island
Minas Bay

NO'VA ZEM'BLA, two large islands in the Arctic Ocean, belonging to Russia and forming a part of the government, or province, of Archangel. They are separated from each other by a narrow strait, the Matochkin Shar (Matthew Strait), and from the mainland of Russia, on the east, by the Strait of Kara. The latter is a part of the northeast passage. The northern island is about 20,000 square miles in area, and the southern, about 15,000 square miles. Together, therefore, they cover an area greater than that of Ireland and nearly equal to that of the state of Indiana. Their coasts are broken by numerous fiords, and the islands are rocky and barren. Innumerable waterfowl are found along their shores, and in the coast waters are seals, dolphins, walruses and whales. In the interior, however, animal life is rarely seen. Vegetation is represented chiefly by stunted growths of mosses, lichens and grass; minerals, by considerable quantities of coal and limited deposits of gold and copper. On the southern island the Russian government has established several settlements of Samoyeds, a Mongolian people of Northeastern Europe. The name Nova Zembla is the equivalent for the Russian *Novaya Zemlya,* meaning *new land.*

These islands were first sighted, in modern times, during the search for the Northwest Passage, and were first visited in 1556. During the latter part of the eighteenth century the Russian government took posssession of them because of the rumors that silver ore was plentiful on them and because of the abundance of sea animals and birds. Part of the coast line was mapped in the early nineteenth century; in 1870 the southern island was first crossed.

NOV'EL, an extended narrative in prose, in which there is a definite plot, more or less involved, and in which an attempt is made truthfully to depict types of character and the manners and customs of the age and country in which the scene is laid. The fact that the novel, while merely a fictitious narrative, is at least probable, distinguishes it from the romance, which deals with mysterious or supernatural types.

All nations, like all children, are fond of stories, and in the early history of almost every people there are evidences of this fondness; but strange as it may at first thought appear, poetry grew up before prose, and in most nations the first stories were in poetic form. The fact that these tales were not set down in writing, but were sung or recited, and were handed down from one bard to another, made the poetic form far more convenient than prose would have been. It is not true, however, that the ancient times had no prose stories. Egyptians, long before the beginning of the Christian era, delighted in some of the tales which centuries later gave pleasure to Europeans; for example, *Cinderella* originated in Egypt in very early times. Greece, also, had prose tales, but none of them have come down to us.

In the Greek provinces in Asia Minor during the early centuries of the Christian era, there grew up a kind of composition which might justly be called romances—harrowing tales of youthful lovers who were separated, subjected to all sorts of possible and impossible adventure, and finally brought together again; and these old tales had a real influence on some that were produced centuries later in Italy and in England. The most famous of the ancient romances which have come down to us is the *Golden Ass* of Apuleius, written in Latin. The exquisite story of Cupid and Psyche, which people of all nations have delighted in, comes from this book, but the rest of it is scarcely up to the standard of that tale.

The interest in this form of literature never entirely died out, but as with the early peoples, so in the medieval age, tales in verse were by far more popular than those in prose. Gradually, however, the change came; long poems, which told of the deeds of the great heroes—Charlemagne, King Arthur, Roland—began to give place to prose romances which dealt with those same personages or with frankly mythical characters. These early attempts at fiction have little resemblance to what is at present known as the novel, for they laid no stress on character delineation, and often the course of the action was so overlaid with moralizing, fine word-painting and description that the plot seemed a minor matter. Chaucer is often considered as a poet only, but he had a very real influence on the development of the novel, for the *Canterbury Tales* are among the finest examples of medieval fiction. An Italian work and a French work—the *Decameron* of Boccaccio and the *Heptameron* of Margaret of Navarre, also stand out prominently among the books of this period.

Influence of the Printing Press. It was the printing press which finally determined that the prose rather than the verse tale should survive; for prose offered decided advantages over verse as a means of expression, and if it might now be preserved in print instead of by word of mouth, what reason existed for holding to the older, more formal manner? Romances of adventure became more and more numerous and popular, and the ideas set forth in them became more and more overdrawn and sentimental. Against these romances of chivalry Cervantes directed his masterly *Don Quixote*, which was so successful that the production of that particular form of fiction practically ceased. *Don Quixote* was more than a satire on contemporary romances, however; it was a vivid portrayal of character, its hero and his squire, Sancho Panza, ranking among the great characters in literature.

The Novel in England. During the Elizabethan Age in England romances were produced, but the spirit of the age found the drama a more fitting expression, and it was not until the eighteenth century that fiction in England began to have an important place. Once established, however, it easily dominated other forms of literature, and this domination has continued to the present day. John Bunyan possessed to a high degree the story-teller's gift, and he had, too, the art which made his story seem true. *Pilgrim's Progress,* however, was not intended merely to entertain; its allegory had a far more serious purpose. In 1719 there appeared a book which was purely a work of fiction—a masterpiece of realism, and this book, *Robinson Crusoe,* by Daniel Defoe, is usually accounted the first in the long line of English novels. His other works had all the art and realism of the first, but no one of them equaled it in interest. Swift published his *Gulliver's Travels* in 1726, but this work must be accounted a satirical romance rather than a novel.

The next great English novelist became one almost by accident. It was not Richardson's purpose originally to produce a work of fiction, but his series of letters gradually took that form, and *Pamela, or Virtue Rewarded,* was received on its publication in 1740 with the greatest enthusiasm. Two other novels by the same author, *Clarissa Harlowe* and *Sir Charles Grandison,* were written in the same form, and were, like the first, extremely long. One thing they all possessed, however, was clear, definite character analysis, one of the most important requirements in any novel. Among the voices which greeted *Pamela* there was one, that of Henry Fielding, which had for the new work with its deliberateness and its excessively moral tone only derision. Fielding at once set to work to produce a tale which should burlesque Richardson's, but he became so much interested in his task that his original aim was overlooked, and he produced, one after the other, *Joseph Andrews, Tom Jones* and *Amelia,* all wonderfully exact pictures of the life of his day. Smollett and Sterne each contributed something to the development of the novel, though in the writings of both there is an absence of definite plot, a carelessness in construction, which makes it almost impossible to rank their works as real novels. Goldsmith's *Vicar of Wakefield* is not remarkable for the construction of its plot, but it has other qualities which place it among the classics of English fiction and make it popular to-day.

Distinctions in the kinds of novels were noticeable from the very first; some laid emphasis on character, some on a delineation of manners, while some depended for interest wholly on a plot, and these distinctions became more and more marked. Among authors of the novel of manners, Frances Burney was the first to win notice, while Jane Austen brought the type to a point of perfection which has never since been equaled. Mrs. Radcliffe and Horace Walpole were early members in what has been called the "skeleton-in-the-cupboard" school; that is, they dealt in all sorts of ghostly horrors. At length the romance began to take a historical turn, Jane Porter having produced a really excellent historic novel in *The Scottish Chiefs.* Foremost among writers of this class in his own and future times was Scott, whose imitators both in his own country and on the continent are numerous.

Charles Dickens, however, was not one of these imitators. To him the novel was rather a picture of present-day life, presented in all its details, whether romantic or sordid. Such wonderful vogue did his novels have that they became a real influence, and of this influence Dickens made use by introducing into almost every novel a crusade against some evil in society. In *Oliver Twist* it was a workhouse system; in *Little Dorritt* the debtors' prison; in *Bleak House* the abuses in the court system. Other authors followed his example, though some of them, as Thackeray, directed their efforts not so much against institutions, as against the shams and hypocrisies of society at large. The only name in this period worthy to rank with those of Dickens and Thackeray is that of George Eliot, whose novels, if not so popular as those of her two great contemporaries, have a power of character analysis rarely, if ever, surpassed.

The list of those who in the nineteenth and early twentieth century in England contributed to the output of novels is long. Some of them, as Charlotte Brontë, Stevenson, Meredith, Hardy, were real masters of this form of writing, while scores of others produced works that have a permanent place in English literature.

American Novelists. The earliest writers in America were men of very serious purpose, who had no thought for fiction. The first to produce anything really worthy of the name of novel was Charles Brockden Browne, whose weird, morbid tales had considerable popularity but are little read to-day. The stirring tales of adventure by James Fenimore Cooper are the

earliest works of fiction produced in America which have a definite, permanent place in the history of literature. Deficient, except in one instance, in the power of character drawing, Cooper knew how to tell a story, and he found and has kept a large audience for his tales of Indians and of the sea. The writings of Washington Irving differ widely from those of Cooper, being of the quiet sort which depends for its interest not on wild adventures but on the faithfulness of its pictures of simple life. He was more successful in his short stories than in his long novels, and this form of fiction has been since his time very popular in America. One of the greatest masters of the short story who ever lived is Edgar Allan Poe, whose tales of horror are as perfect in their way as are his analytical stories. Following Poe is Hawthorne, the supreme fiction writer of America. His books are not novels in the exact sense—he himself called them romances; but they are romances of a particular kind which he brought to a point of perfection.

Later writers of fiction in America have been very numerous, some of them producing works which have ranked high at home and abroad; scores and even hundreds of others simply swelling the output of the presses with works which have no literary merit and which will not be remembered after their own day. Of such works, many meet with no success whatever; the ordinarily successful attain a sale of from five to ten thousand, while a few favored ones, by no means always the best, reach and go beyond the hundred thousand mark. *David Harum,* written by a banker, ill and dying, and published in 1898, had a sale of nearly a million copies.

Canada was until late in the nineteenth century behind the rest of the English-speaking world in the production of novels, but to-day many of its novelists rank among the best of contemporary fiction writers. At the head of the list stands Sir Gilbert Parker, and the next in popular esteem is probably Charles William Gordon, better known as Ralph Connor.

The excessive output of novels is to be deprecated because the reading of them creates a distaste not only for worthier and more serious forms of literature, but for the classic in fiction.

A.MC C.

Related Subjects. The following general articles may be referred to by the reader:

American Literature
Canadian Literature
Classics
English Literature
Fiction
French Literature
German Literature
Romance

Much material of interest will be found, also, in the following biographies of novelists:

Abbott, Jacob
Alcott, Louisa May
Alden, Isabella McDonald
Aldrich, Thomas Bailey
Alger, Horatio
Allen, Charles Grant B.
Allen, James Lane
Andersen, Hans Christian
Annunzio, Gabrielle d'
Atherton, Gertrude
Austen, Jane
Bacheller, Irving
Bacon, Josephine Dodge Daskam
Balzac, Honoré de
Barbour, Ralph Henry
Barr, Amelia
Barr, Robert
Barrie, Sir James Matthew
Bates, Arlo
Beach, Rex
Bennett, Arnold
Besant, Sir Walter
Björnson, Björnstjerne
Blackmore, Richard Doddridge
Boccaccio, Giovanni
Bourget, Paul
Brady, Cyrus Townsend
Bronte, Charlotte
Bulwer-Lytton, Edward George Earle
Bunyan, John
Burnett, Frances Eliza Hodgson
Cable, George Washington
Caine, [Thomas Henry] Hall
Cervantes Saavedra, Miguel de
Chambers, Robert
Chauveau, Pierre J. O.
Chester, George Randolph
Churchill, Winston
Clemens, Samuel Langhorne
Collins, [William] Wilkie
Cooper, James Fenimore
Corelli, Marie
Cotes, Sara Jeannette Duncan
Craigie, Pearl Richards
Craik, Dinah Maria Mulock
Crane, Stephen
Crawford, Francis Marion
Daudet, Alphonse
Davis, subhead Richard Harding Davis
Defoe, Daniel
DeMille, James
Dickens, Charles
Disraeli, Earl of Beaconsfield
Dixon, Thomas J.
Dodgson, Charles Lutwidge
Doyle, Sir Arthur Conan
Dumas
Du Maurier, George Louis
Duncan, Norman
Ebers, Georg Moritz
Edwards, Harry Stillwell
Eggleston, Edward
Fielding, Henry
Foote, Mary Hallock
Ford, Paul Leicester
Fox, John, Jr.
Freeman, Mary E. Wilkins
French, Alice
Galsworthy, John
Garland, Hamlin
Gaskell, Elizabeth Cleghorn
Gaspé, Philippe Aubert de
Gerin-Lajoie, Antoine
Glyn, Elinor
Goldsmith, Oliver
Gordon, Charles William
Gorky, Maxim
Gutzkow, Karl Ferdinand
Haggard, Sir Henry Rider
Halévy, Ludovic
Haliburton, Thomas C.
Hardy, Thomas
Harraden, Beatrice
Harris, Joel Chandler
Harte, [Francis] Bret
Hawkins, Anthony Hope
Hawthorne, Nathaniel
Hearn, Lafcadio
Henty, George Alfred
Herrick, Robert [Welch]
Hewlett, Maurice Henry
Heyse, Paul
Hichens, Robert
Holland, Josiah Gilbert
Holmes, Oliver Wendell
Howells, William Dean
Hughes, Thomas
Hugo, Victor Marie
Jackson, Helen Fiske Hunt
James, Henry
Jerome, Jerome Klapka
Johnston, Mary
Jokai, Maurus
Kingsley, Charles
Kipling, Rudyard
Kirby, William
Lagerlöf, Selma

Leacock, Stephen B.
Lemay, L. P.
Lesage, Alain René
Lever, Charles James
London, Jack
Lorimer, George Horace
Loti, Pierre
Maartens, Maarten
McCutcheon, George B.
Macdonald, George
Marryat, Frederick
Maupassant, Henri Guy de
Meredith, George
Merimée, Prosper
Mitchell, Silas Weir
Moodie, Susanna
More, Sir Thomas
Morris, subhead Gouverneur Morris
Munroe, Kirk
Murfree, Mary Noailles
Nicholson, Meredith
Oliphant, Mrs. Margaret
Oliver Optic
Page, Thomas Nelson
Parker, Sir Gilbert
Perrault, Charles
Porter, Gene Stratton
Porter, Jane
Porter, William Sydney
Quiller-Couch, Arthur Thomas
Rabelais, François
Ramee, Louise de la
Read, Opie Percival
Reade, Charles
Reid, [Thomas] Mayne
Rice, Alice Hegan
Richardson, Samuel
Riggs, Kate Douglas Wiggin
Rinehart, Mary Roberts
Rives, Amélie
Roberts, Charles G. D.
Roe, Edward Payson
Rohlfs, Anna Katharine Green
Saint-Pierre, Jacques Henri Bernardin
Sand, George
Scott, Walter, Sir
Seton, Ernest Thompson
Sienkiewicz, Henryk
Sinclair, Upton
Smith, Francis Hopkinson
Sterne, Laurence
Stevenson, Robert Louis Balfour
Stockton, Francis Richard
Stowe, Harriet Elizabeth Beecher
Sue, Marie Joseph Eugène
Tarkington, Newton Booth
Terhune, Mary Virginia Hawes
Thackeray, William Makepeace
Thompson, James Maurice
Tolstoi, Lyoff [Leo] Nikolayevitch
Trollope, Anthony
Trowbridge, John T.
Turgenieff, Ivan Sergeyevitch
Van Dyke, Henry
Verne, Jules
Wallace, Lewis
Ward, Elizabeth Stuart Phelps
Ward, Mrs. Humphrey
Watson, John
Wells, H. G.
Weyman, Stanley John
Wharton, Edith
White, Stewart Edward
Whitney, Adeline Dutton Train
Wieland, Christoph Martin
Wilson, Augusta Evans
Wister, Owen
Yonge, Charlotte Mary
Zangwill, Israel
Zola, Emile

NOVEM'BER has had fewer good words spoken for it, perhaps, than any other month.

> When chill November's surly blast
> Made fields and forests bare,

wrote Burns, and Taylor, in his *November,* tells how—

> Wrapped in his sad-colored cloak, the Day, like a Puritan, standeth
> Stern in the joyless fields, rebuking the lingering color.

On the other hand, Thoreau, a lover of nature in all its moods, writes appreciatively:

> As fruits and leaves and the day itself acquire a bright tint just before they fall, so the year ear its setting. October is its sunset sky; November the later twilight.

In temperate regions November, more than any other month, seems the season of death. No softening snow hides the bareness of the fields, and shrill, gusty winds whirl about the dead leaves which have lost the last vestige of their gorgeous October color. Autumn seems over, and winter has not begun. The Anglo-Saxons, who had a way of naming things simply and picturesquely, called November the "wind month" or the "blood month," the latter name probably having reference to the killing of animals for the winter supply of meats. The month is by no means without its special attractions, and many a lover of out-of-doors finds the hazy, mystical days of Indian summer (which see) the most delightful season of the year.

History of the Month. November was one of the months to which the Romans never troubled themselves to give a specific name.

NOVEMBER CALENDAR

Birthdays

2. Marie Antoinette, 1755.
   James K. Polk, 1795.
3. William Cullen Bryant, 1794.
   J. A. Early, 1816.
4. William III of England, 1650.
5. Ella Wheeler Wilcox, 1855.
6. John Philip Sousa, 1856.
9. Ambrose P. Hill, 1825.
   Frederick Funston, 1865.
10. Mohammed, 570.
    Martin Luther, 1483
    Oliver Goldsmith, 1728.
    Friedrich Schiller, 1759.
    Joaquin Miller, 1841.
    Henry Van Dyke, 1850.
11. Thomas Bailey Aldrich, 1836.
13. Saint Augustine, 354.
    Robert Louis Stevenson, 1850.
14. Jacob Abbott, 1803.
15. William Pitt, 1708.
16. John Bright, 1811.
    Louis A. Fréchette, 1839.
18. Asa Gray, 1810.
19. James A. Garfield, 1831.
20. Thomas Chatterton, 1752.
    Sir Wilfrid Laurier, 1841.
21. Mary Johnston, 1870.
22. Sieur de La Salle, 1643.
    George Eliot, 1820.
23. Franklin Pierce, 1804.
    Sir Gilbert Parker, 1862.
24. Laurence Sterne, 1713.
25. Andrew Carnegie, 1837.
28. Anton Rubinstein, 1829.
29. Sir Philip Sidney, 1554.
    Louisa M. Alcott, 1832.
30. Jonathan Swift, 1667.
    Samuel L. Clemens, 1835.

Events

1. Lisbon destroyed by an earthquake, 1755.
2. Nicholas II proclaimed emperor of Russia, 1894.
3. Close of Thirty Years' War, 1648.
   Letter postage in Canada reduced to two cents, 1890.
   Bombardment of Dardanelles by British and French fleets begun, 1914.
4. Denver became the capital of Colorado, 1881.
   Enormous coal fields discovered in Nova Scotia, 1889.
5. Failure of Gunpowder Plot, 1605.
   England declared war on Turkey, 1914.
6. Jefferson Davis elected President of Confederacy, 1861.
7. Battle of Tippecanoe, 1811.
8. Last spike driven in Canadian Pacific Railway, 1885.
   Reciprocity treaty between United States and Newfoundland, 1901.
9. Kentucky admitted into the Confederacy, 1861.
10. "Kentucky Resolutions" passed, 1798.
    Second battle of Ypres began, 1914.
11. Armistice Day, 1918.
    Washington became a state, 1889.
12. Earl of Minto became Governor-General of Canada, 1898.
14. Name "Austria-Hungary" chosen by Dual Monarchy, 1868.
15. Articles of Confederation adopted, 1777.
16. Battle of Lützen, 1632.
    Louis Riel executed, 1885.
    Oklahoma became a state, 1907.
17. Congress met for the first time in Washington, 1800.
18. Treaty signed by United States and Panama providing for isthmian canal, 1903.
19. Battle field of Gettysburg made a national cemetery, 1863.
20. Vasco da Gama sailed around the Cape of Good Hope, 1497.
21. Port Arthur captured by Japanese, 1894.
23. First day of Battles of Chattanooga, 1863.
24. The "Battle above the Clouds," 1863.
25. Last day of Battles of Chattanooga, 1863.
26. First American street railway opened, in New York City, 1832.
27. Hoosac Tunnel completed, 1873.
30. Preliminary treaty of peace between United States and Great Britain, 1782.
    Serbs lost Monastir, 1915.

For Study

Angelus, The
Apple
Autumn leaves
Boughton, G. H.
Coal
Courtship of Miles Standish
Cranberry
Duck
Gratitude
Heating and Ventilation
Indians
Indian Summer
Kingfisher
Loon
Lumbering
Pilgrims
Potato
Protection of Seeds
Pumpkin
Squash
Squirrel
Story of David and Jonathan
Thanksgiving
Thermometer
Trees, with special reference to bark and shape of branches
Turkey
Wheat

QUOTATIONS FOR NOVEMBER

1. November woods are bare and still;
   November days are clear and bright;
   Each noon burns up the morning's chill,
   The morning's snow is gone by night.
   —*Jackson.*

2. What visionary tints the year puts on,
   When falling leaves falter through motionless air
   Or numbly cling and shiver to be gone!
   —*Lowell.*

3. Glorious are the woods in their latest gold and crimson,
   Yet our full-leaved willows are in their freshest green.
   Such a kindly autumn, so mercifully dealing
   With the growths of summer, I never yet have seen. —*Bryant.*

4. Think, oh, grateful, think!
   How good the God of Harvest is to you,
   Who pours abundance o'er your flowing fields. —*Thompson.*

5. The dusky waters shudder as they shine,
   The russet leaves obstruct the straggling way
   Of oozy brooks, which no deep banks define,
   And the gaunt woods, in ragged, scant array,
   Wrap their old limbs with sombre ivy twine. —*Hartley Coleridge.*

6. In rattling showers dark November's rain
   From every stormy cloud, descends amain. —*Ruskin.*

7. A thankful heart is not only the greatest virtue, but the parent of all the other virtues. —*Cicero.*

8. The wild November come at last
   Beneath a veil of rain;
   The night wind blows its folds aside,
   Her face is full of pain. —*Stoddard.*

9. Gratitude is the fairest blossom that springs from the soul; and the heart of man knoweth none more fragrant.
   —*Ballou.*

10. Four things a man must learn to do
    If he would make his record true:
    To think without confusion clearly;
    To love his fellow-men sincerely;
    To act from honest motives purely;
    To trust in God and Heaven securely.
    —*Van Dyke.*

11. And Autumn, in his leafless bowers,
    Is waiting for the Winter's snow.
    —*Whittier.*

12. The sun of the Indian Summer
    Laughed at the bare old trees,
    As they shook their leafless branches
    In the soft autumnal breeze.
    —*Vining-Yule.*

13. It is very nice to think
    The world is full of meat and drink,
    With little children saying grace
    In every Christian kind of place.
    —*Stevenson.*

14. Fear not November's challenge bold—
    We've books and friends,
    And hearths that never can grow cold:
    These make amends! —*Fraser.*

15. I've heard of hearts unkind, kind deeds
    With coldness still returning;
    Alas! the gratitude of men
    Hath often left me mourning.
    —*Wordsworth.*

16. The melancholy days are come, the saddest of the year,
    Of wailing winds, and naked woods, and meadows brown and sear.
    —*Bryant.*

17. No shade, no shine, no butterflies, no bees;
    No fruit, no flowers, no leaves, no birds,
    November! —*Hood.*

18. Let the man who would be grateful think of repaying a kindness, even while receiving it. —*Seneca.*

19. Departing wild birds gather
    On the high branches, ere they haste away,
    Singing their farewell to the frigid ether
    And fading day. —*Ramsay.*

20. But let the good old corn adorn
    The hills our fathers trod;
    Still let us, for His golden corn,
    Send up our thanks to God!
    —*Whittier.*

21. I saw old Autumn in the misty morn
    Stand shadowless like silence, listening
    To silence, for no lonely bird would sing
    Into his hollow ear from woods forlorn,
    Nor lowly hedge nor solitary thorn.
    —*Hood.*

22. For strong souls
    Live like fire-hearted suns; to spend their strength
    In furthest striving action. —*Eliot.*

23. O give thanks unto the Lord for he is good; for his mercy endureth forever.
    —*Psalms.*

24. Dressed in robes of gorgeous hue,
    Brown and gold with crimson blent,
    The forest to the waters blue
    Its own enchanting tints has lent.
    —*Moodie.*

25. Yet one smile more, departing, distant sun!
    One mellow smile through the soft vapory air,
    Ere o'er the frozen earth the loud winds run,
    Or snows are sifted o'er the meadows bare. —*Bryant.*

26. It is a good thing to give thanks unto the Lord and to sing praises unto thy name, O most High. —*Psalms.*

27. Some hae meat that canna eat,
    And some would eat that want it,
    But we hae meat and we can eat,
    So let the Lord be thankit. —*Burns.*

28. Blow, blow thou winter wind,
    Thou art not so unkind
    As man's ingratitude.
    —*Shakespeare.*

29. I am glad a task to me is given,
    To labor at day by day;
    For it brings me health and strength and hope,
    And I cheerfully learn to say—
    Head, you may think, Heart, you may feel,
    But Hand, you shall work alway.
    —*Alcott.*

30. Autumn wins you best by this, its mute
    Appeal to sympathy for its decay.
    —*Browning.*

"The ninth month" it was called, for that was originally its place in the year; and from the Latin word *novem,* meaning *nine,* has come the present name. Later, when two extra months were added, November became what it is to-day, the eleventh in the series, but its name was never changed. At one time, however, a change was suggested. July had been renamed for Julius Caesar, August for Augustus Caesar, and a subservient senate offered to call the eleventh month after Tiberius Caesar, but he declined, saying "What will you do if you have *thirteen* emperors?"

The number of days in the month has not been so constant. Originally there were thirty, then twenty-nine, and again thirty-one, but from the time of Augustus it has had thirty days, as at present.

Its Part in the Year's Activities. As nature seems to be holding its breath, so many of the out-of-door activities are at a standstill. The harvesting season is over, the crops are secure in the barns, and thus there comes each year a repetition of that experience of the Pilgrims which resulted in the proclamation of the first Thanksgiving. In the United States this is the outstanding festival of the month, but in Canada, where crops are gathered somewhat earlier, Thanksgiving Day falls in October. See THANKSGIVING DAY.

Of the sports, the one which seems to belong specifically to November is football. The exciting scrimmages which would be too violent in the earlier months seem to warm the blood not only of the contestants but of the spectators as well, for scores of thousands of people in the United States and Canada sit through the game and feel no discomfort from the frosty air.

NOYES, *noyz,* ALFRED (1880-), one of the foremost English poets of to-day. His work combines a straightforward manliness with the simple vision of a child, that joyous optimism which refuses to admit that sordid appearances represent the truth and delights in an old-fashioned fairyland. His earlier works, among them the *Flower of Old Japan, Forest of Wild Thyme* and *Tales of the Mermaid Tavern,* made little effort to interpret our own times, but *The Wine Press,* inspired by the Balkan War, *A Belgium Christmas Eve* and other recent verse are the poet's protest against war. His work shows great technical skill, but although he is fond of sudden changes of meter, he does not indulge in the unconventionality characteristic of many current poets.

Alfred Noyes was born in Staffordshire in 1880, and studied at Exeter College, Oxford. In 1913 he delivered a course of lectures at the Lowell Institute, Boston, on *The Sea in English Poetry.* The same year he received the degree of Doctor of Letters from Yale University. Among his later works are *The Elfin Artist, Beyond the Desert* and *Sherwood.*

N-RAYS, the name given to a form of radiation discovered by the French physicist Blondlot in 1903, while experimenting with X-rays. N-rays will pass through such solid substances as wood, paper and metals, but will not penetrate rock salt, platinum or water. They are said to be present in sunlight, and in the light given by a Welsbach burner, an ordinary gas flame or white-hot metal.

Another French experimenter, Dr. Charpentier, also declared that N-rays were given off by living plants and animals, and that these rays were visible and more or less brilliant according to the part of the body most active. If these observations were accepted, it would furnish grounds for a physiological theory of mental telepathy. But other scientists than Blondlot have been unable to obtain N-rays, and therefore question their existence. See ROENTGEN RAYS.

NU'BIA, a name now given to a great portion of what was formerly called Ethiopia, extending on both banks of the Nile River from Egypt to Abyssinia. On the east it is bounded by the Red Sea, on the west by the Desert of Sahara, but here it has no clearly defined geographical limits. Except in the valley of the Nile the country consists only of desert. Suakin, on the Red Sea, is the only town of any commercial importance. The country was subject to Egypt until the revolt of the Mahdi in 1885, when it was overrun by Sudanese. It was restored to Egypt by Lord Kitchener's campaigns of 1896 and 1898, at which time he received the popular name, Kitchener of Khartum. The two best-known towns are Khartum and Omdurman, though they are of little importance.

NUISANCE, *nu'sans,* in law, such a use of private or public property or such personal conduct as will work damage to another. For example, a slaughterhouse in a residential section of a city would be a nuisance, because its foul odors would render adjoining houses uninhabitable. Boisterous conduct, especially at unseasonable hours of the night, so that it prevents those in the neighborhood from sleeping, is a nuisance. The location is a strong factor

in determining whether or not a thing is a nuisance. The slaughterhouse in the open country is not a nuisance, because it annoys no one. Even a steam engine, if placed in a building so near a dwelling that the jar and noise of the machinery annoy the occupants, may be declared a nuisance. If the nuisance is such that it annoys the whole or a part of a community it is a *public* nuisance. If it annoys but few people it is a *private* nuisance. The slaughterhouse in a residential section would be a public nuisance.

A nuisance may be abated by persuading the owner to remove to some other locality, or by suit at law. A nuisance may usually be prevented if taken in season by securing an injunction (which see) against the one who is about to establish it, but an injunction cannot prevent something already done. A private nuisance may be abated by mutual agreement between the parties or by a suit for damages. It may also be prevented by injunction. It is often difficult to determine when an annoyance becomes a nuisance, and in cases where the parties cannot mutually agree, the courts must decide.

NULLIFICATION, *nul i fi ka' shun.* To nullify is to render a proposal or an act void. The word *nullification* refers to a phase of United States history in which the people of one section sought to declare certain laws of no effect, so far as said laws related to them. The period was critical, but a resolute President restored order and respect for the nation's mandates.

The nullification doctrine implied the theory of the sovereignty of the state—that it could accept or reject any law passed by the United States Congress. The first serious proposal in this direction was the "Exposition and Protest" of 1828 in South Carolina, which John C. Calhoun prepared at the request of the legislature of that state. It objected to the protective tariff passed in that year by Congress, argued that any state was free to annul it and that the Federal government was but the servant of the states. This event led to the great Webster-Hayne debate in the United States Senate in 1830, which Webster closed with the thrilling peroration—

> Liberty and Union, now and forever, one and inseparable.

The theory of nullification yet persisted, and in 1833 South Carolina again declared the tariff laws of 1828 and 1832 null and void, so far as that state was concerned. It threatened, moreover, to leave the American Union if the Federal government attempted to enforce the tariff laws anywhere in South Carolina. President Andrew Jackson met the challenge by a proclamation warning the people that the laws would be enforced, and he took steps to secure obedience to tariff regulations at the important port of Charleston. It became apparent, after passage of a Force Bill in Congress providing for obedience to the Federal law, that resistance was unwise; compromises in tariff rates were agreed upon, and the nullification ordinance was repealed.

The states' rights theory, of which the above was one manifestation, was declared, early in the nation's history, in the Kentucky and Virginia Resolutions. It was not finally disposed of until the War of Secession.

Related Subjects. The reader is referred to the following articles in these volumes:

Calhoun, John Caldwell
Force Bills
Hayne, Robert Young
Jackson, Andrew
Kentucky and Virginia Resolutions
States' Rights

See, also, references suggested in the above articles.

NU'MA POMPIL'IUS, in Roman legendary history, the second king of Rome, the successor of Romulus. According to tradition, he came to the throne in 715 B.C., and reigned until 672 B.C. The Romans of a later day looked back to that time as a period of blessing and peace and ascribed to Numa most of the institutions, religious or civil, upon which the prosperity of the early state rested. Thus it was he who built the temple of Janus, the doors of which were shut during his reign to show that peace prevailed; it was he who originated the order of the Vestal Virgins (see VESTA), and who appointed the first priests and augurs. In reality, however, these institutions which were ascribed to him were the slow growth of centuries.

NUM'BER. The picture developed in the mind by the word *tree* is that of only one of those tall-growing plants. From the word *trees,* on the contrary, one gets the image of several trees, a row, a grove, or a forest, as the context may imply. Similarly, the pronoun *he* conveys to us the idea of one person; *they* compels one to think of a number of persons. The property of a noun or a pronoun which thus distinguishes one from more than one is called *number.*

Tree and *he* are said to be in the *singular number. Trees* and *they* are in the *plural number,* the word *plural* coming from the Latin *plus,* meaning *more.*

Number and Inflection. Number affects nouns, pronouns and verbs. The great majority of nouns and pronouns are inflected for number—that is, changed in form; but in the case of verbs, which must agree with the number of their subjects, such inflection is limited to the present tense, third person singular; as, he *skates,* they *skate;* but, he *skated,* they *skated.* See INFLECTION.

Plurals Formed Regularly. Most English nouns are pluralized by adding *s* to the singular: cake, *cakes,* frog, *frogs,* crow, *crows,* barn, *barns.* In the following cases this regular ending becomes *es:*

1. When the singular ends with *s, z, x, sh* or *ch,* since *s* alone would not result in a pronounceable word; as, loss, *losses,* circus, *circuses,* waltz, *waltzes,* affix, *affixes,* brush, *brushes,* church, *churches.*

2. When the singular ends in *o* preceded by a consonant; as, echo, *echoes,* potato, *potatoes.* There is an exception in the case of certain words borrowed from foreign languages, such as canto, *cantos,* zero, *zeros.* In a few nouns either ending is allowable: *buffaloes* or *buffalos; mosquitoes* or *mosquitos.* If a vowel precedes the *o,* the plural is regularly formed: *cameos, kangaroos.*

3. When the singular ends in *y* preceded by a consonant, in which case the *y* is changed to *i;* as, cherry, *cherries,* firefly, *fireflies,* duty, *duties.*

4. In many words ending in *f,* in which case the *f* is changed to *v;* as wharf, *wharves,* loaf, *loaves,* half, *halves.*

Irregularities. In a few nouns of Anglo-Saxon origin the root vowel is changed in the plural; tooth, *teeth,* man, *men,* woman, *women.* In several other old English words the plural form has an irregular ending; child, *children,* ox, *oxen.*

Special Cases. 1. Some old English plurals exist side by side with a modern regular plural, the two forms having different uses, as, *brothers* (members of the same family), *brethren* (members of the same church or society). Other such words are die, *dies, dice;* penny, *pennies, pence;* pea, *peas, pease.* The meaning of each plural should be carefully studied from the dictionary.

2. In some words the singular and plural forms are alike: *series, heathen, sheep, deer, moose, quail, perch, fish.* The last three, however, have a regular plural when individuals are singled out; as, The last two *perches* I caught are much smaller than the *perch* for which this lake is noted.

3. Some words, like *proceeds, alms, riches, thanks,* have no corresponding singular form; some, like *brightness, patience, perseverance* and other abstract nouns, are never used in the plural. Others have plural form but singular meaning and always take a singular verb; as *news, physics, economics, molasses, summons.*

Plurals of Compounds. It is the important part of the compound that takes the plural form—the word described by the rest. Thus, we pluralize the first word in *sisters-in-law,* but the last in *stepsisters.* Similar examples are *carloads, handfuls, men-of-war, commanders-in-chief.* One or two compound nouns pluralize both parts: *menservants, womenservants.*

Plurals of Foreign Words. Many foreign words in regular use form their plurals in the English way. We commonly say *bandits,* not the Italian *banditti; indexes,* not the Latin *indices.* Others, however, retain their foreign plurals; axis, *axes,* datum, *data,* radius, *radii,* phenomenon, *phenomena.* Some have both an English and a foreign plural form; *beau, beaus, beaux.* No rules can be formulated to cover these cases; each one must be learned for itself.

Pluralizing Proper Names. If there is no title, we simply add *s: the Franklins, the Smiths.* If the name is preceded by a title, the present tendency is to pluralize the title, unless it is preceded by a numeral; as, *the Misses Wilson; the two Miss Wilsons.* Some good writers prefer to pluralize the name in all cases, saying *the Miss Wilsons;* but it is no longer considered good form to pluralize both.

Agreement in Number. A pronoun must agree with the number of its antecedent and a finite verb with the number of its subject; as, Each of the women who *were* present at the banquet *was* given a valuable souvenir. Collective nouns derive their number, not from their form, which is always singular, but from their meaning, which is frequently distributive and therefore plural. Thus, we say, The committee *is* to meet here on Thursday; but, The committee *were* unable to bring *their* conflicting *opinions* into harmony. See NOUN, subhead *Collective Nouns.* W.F.R.

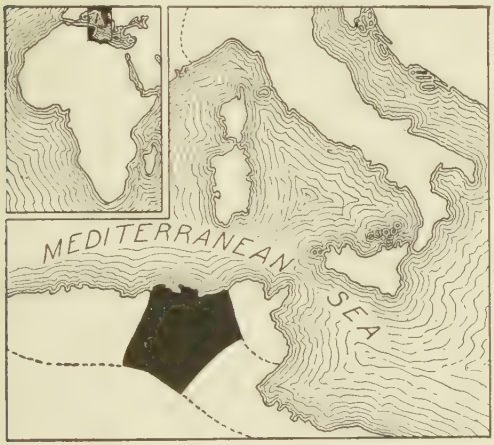
NUMBERING MACHINE, a device for stamping consecutive numbers on checks, railway tickets, etc. The type machine has a number of disks with figures on the circumference, revolving upon a single axle. The first, or unit, wheel contains numbers up to 9, and is moved forward with each pressure upon the wheel. When the units are thus exhausted, the wheel registering the tens comes into play. For every ten units registered, an additional ten is marked up until the hundred mark is reached, when the next wheel in the series is called into action. The wheels can be so multiplied as to register numbers of five or six figures automatically. A good numbering machine may be purchased for less than ten dollars.

NUMBERS, the fourth book of the Pentateuch, continuing the narrative of *Exodus* and

Leviticus. It covers thirty-eight years in time and follows the Israelites in their journey from Mount Sinai to the plains of Moab. A census, or numbering of the people, was made at the beginning and at the end of the wanderings. Like other books of this period, it comprises stories, records and laws from many sources. One of the picturesque passages of literature is that describing the Twelve Tribes on the march, ideally organized, with Jehovah in their midst. The poems of Balaam, in chapters XXIII-XXIV, are nobly prophetic of the future of the Israelitish nation. See PENTATEUCH.

NUMBERS, DIVISIBILITY OF. See DIVISIBILITY OF NUMBERS.

NUMID'IA, the ancient Roman name for a district in North Africa which roughly corresponds to the modern territory of Algeria. When conquered by the Romans in 46 B. C., Numidia became a flourishing and highly civi-



LOCATION OF NUMIDIA
Shown in black, in North Africa. The portion in black in the small corner map represents the area of the larger map.

lized state. It was afterwards conquered by the Vandals, who were in turn driven out by Arabs. The latter were in turn conquered by the French, who now hold a vast expanse of territory in the northern part of the continent. The Berbers of to-day are descendants of the ancient Numidians. See BERBERS.

NUMISMATICS, *nu mis mat'iks,* the science which treats of coins and medals, with reference to their description, beauty, value, classification and history. Many men and women who began as children to gather rare coins have during their lifetime acquired collections worth thousands of dollars. These are frequently presented to museums, or placed in historical exhibits, where they may be examined by the public. To-day the term *coin* is given to small pieces of metal impressed with a design for the purpose of circulation as money, while *medal* is used to designate those not intended for circulation. However, very ancient coins are sometimes called *medals* by collectors.

Every coin has five parts. The side bearing the head, bust, figure or emblem of the country, person or event in honor of which the coin was made is called the *face* or *obverse.* The opposite side, with its designs or words is the *reverse.* Letters stamped around the border are the *legend,* while those in the middle or field are the *inscription.* On some coins a line divides the *inscription* from the basis or *exergue,* which contains the date, signature of the designer, and formerly the mint mark. *Struck* coins are made by exerting enough pressure on the die to transfer the design, while others are produced by pouring molten metal into molds. The latter are said to be *cast,* and the weight of either sort determines whether they are genuine. Gold, silver, bronze, nickel and copper are most commonly used for making coins, and the round shape has been generally adopted.

In the seventh century B. C. the Greeks issued coins, the oldest known, while Petrarch (1304-1374), an Italian poet, was the earliest collector of note. The United States Mint in Philadelphia, established in 1793, was the first in the United States (see MINT). Modern coin-making is a most complicated and interesting process (see COINAGE).

There is no set method for arranging coin collections; sometimes they are laid out according to their geographical relations; sometimes in accordance with their age; while in other cases they are arranged in series of denominations or metals. However they are kept, besides having a real money value according to their rarity, they shed interesting light upon the art, mythology, history, religion, geography and literature of the times which they represent. Many rare coins bring large prices from dealers. The following are a few examples:

Rare American Coins

DATE	COIN	VALUE
1849	Double Eagle (Twenty-dollar gold piece)	$ 100.00
1798	Ten-dollar gold piece (4 or 6 stars)	25.00
1815	Five-dollar gold piece	100.00
1804	Silver dollar	1,000.00
1853	Half dollar (no arrows at date)	50.00
1823	Quarter dollar (head to left)	50.00
1804	Dime (fillet head)	7.00
1877	Five-cent piece (proof)	1.50
1799	Copper cent (fillet head)	8.00

Rare English Coins

DATE	COIN	VALUE
1558	Half sovereign (bust Queen Elizabeth; reverse, arms)	$ 15.00
1603	Half crown (bust James I; reverse, arms crowned)	7.50
1690	Guinea (busts William and Mary; reverse, arms crowned)	15.00

Rare Canadian Coins

DATE	COIN	VALUE
1822	Half dollar	$ 6.50
1870	Five cents (Confederation coin)	.15
1870	Ten cents (Newfoundland; head of Victoria)	.35
1862	Twenty cents (New Brunswick; head of Victoria)	.65

NUMMULITE, *num'u lite,* a genus of fossils whose name was suggested by their resemblance to coins. The word is derived from the Latin *nummus,* meaning *money.* Nummulites are circular, coin-shaped bodies, varying in size from the merest speck to a half-dollar. The shell is composed of a series of small cavities arranged in the form of a spiral, and having partitions communicating with one another by means of small internal openings; there is no apparent outer opening. There are in various parts of the world limestone formations, sometimes several hundred feet thick, which consist of these fossil shells, and the Egyptian Pyramids are built largely of them. Nummulites were abundant in the early part of the Cenozoic Era (see GEOLOGY).

NUN, in the Roman Catholic Church, is the name given to a woman who renounces the world, enters a religious community and devotes her life to religious service, mainly through works of mercy and charity. The word is supposed to have originated in a Coptic (Christian Egyptian) word meaning *pure.* There are many orders of nuns, with various missions in life. Some care for the sick and wounded, others protect the aged and the friendless, while still others engage in educational work; but the vows in all these orders are very similar. The first convent for women was founded about A. D. 250 by a sister of Saint Anthony, in the Egyptian desert; the first one in England was founded by Eadbald, king of Kent, at Folkstone in 630. See MONASTICISM.

NUNC DIMITTIS, *nungk di mit'is,* the rapturous psalm of Simeon, in *Luke* II, 29-32, uttered at sight of the babe Jesus when he was presented at the Temple. The name was derived from the first two words in the Latin version, meaning "Now lettest thou depart." It has been in use as a part of Christian evening worship since the fifth century.

NUNCIO, *nun'shi o,* a Roman Catholic official corresponding to an ambassador or minister who represents a temporal state at a foreign capital. Nuncios, who are representatives of the Pope, are maintained in Vienna, Madrid, Lisbon, Bavaria, Belgium and Brazil. Officials having the same powers as nuncios, but inferior rank, are known as *internuncios.* The latter are maintained in Chile and the Argentine Republic. See LEGATE.

NU'REMBERG, one of the quaintest and most interesting cities of Germany, particularly famous as the world's manufacturing center for all kinds of children's toys made in metal. It presents a faithful picture of the well-to-do town of three hundred years ago, with its moats and many-towered walls; its curious gateways; its royal castle, perched high above the city; its narrow, crooked streets, lined with houses whose gables turn toward these streets; its bridges, spanning the Pegnitz River, which divides it into two parts; its quiet market place, and its many beautiful fountains. The city's numerous churches and charitable, educational, scientific and artistic institutions are all on a scale worthy of its ancient dignity, for Nuremberg is regarded as the nursery of German poetry and the cradle of German art.

There Adam Krafft carved his famous stone tabernacle; there Peter Vischer and his sons worked to produce their masterpiece, the shrine of Saint Sebald; there lived Albrecht Dürer, the evangelist of art, and his home is still pointed out with great pride. Nuremberg was the first city in Germany to found a gymnasium, a sort of secondary school for the people. In 1500, Peter Hemlein invented watches, first known as "Nuremberg eggs." The first paper mill in Germany was established there, and printing was early introduced on a large scale.

The old proverb, "Nuremberg's hand goes through every land," is true, for, though not now of such great relative importance as of yore, this enterprising city in Bavaria, ninety-five miles north of Munich, continues to occupy a high place among the industrial and commercial centers of Europe. Nuremberg is still the center of the great toy industry of Germany. In the city are made most of the toys which gladden the hearts of children the world over, especially the famous tin soldiers, and every conceivable kind of toy pinched or shaped out of metal. These, together with the carved wood, ivory, etc., are known as the famous

"Nuremberg" wares. Over two hundred factories produce, in addition, lead pencils, chemicals and electrical supplies.

It is this commingling of art, of commerce, of learning, of trade, of religion and of daily life that makes Nuremberg so interesting. Its historic associations are also important; it was an independent imperial town until 1806 and one of the first of the imperial towns to cast its lot for the Reformation. Its inhabitants suffered intensely during the Thirty Years' War, when Gustavus Adolphus was besieged there by Wallenstein. Population, October, 1919, 352,675. R.D.M.

NURSE, a person who cares professionally for the sick, the infirm or for very young children. In modern usage the term is usually applied to one who has taken a course of study, including practice in the care of the sick, in a hospital training school. The nursing field is occupied almost exclusively by women, male nurses being the exception. Professional trained nurses are found in hospitals, in social settlements, in charitable institutions and in private homes. In many localities district nurses are employed to visit the homes of the poor, and a late addition to the force of the public schools is the school nurse, who follows up medical inspection, visits the homes of ailing children and teaches classes in hygiene. Nurses in the employ of the Red Cross Societies (which see) not only go to the field of action in time of war, but they also engage in the fight against preventable diseases, as tuberculosis, in time of peace. Modern trained nursing grew out of the work of Florence Nightingale, heroine of the Crimean War. For a detailed account of the training required of nurses, consult the article Hospital, subhead *Training of the Nurse.* See, also, Nightingale, Florence.

NURSERY, *nur'ser i,* in agriculture, a plot of ground devoted to the raising of ornamental and shade trees, fruits trees, vines and shrubs, which are sold for transplanting or grafting (which see). Nurserymen not only keep up the supply of useful plants, but they render valuable service in improving methods of propagation and in studying ways and means of arresting plant diseases. According to the Thirteenth Census, there are in the United States over 5,500 special establishments devoted exclusively to the raising of nursery products; the acreage in these products is over 80,000 and their total value is more than $21,000,000. The three leading states in value of products are New York, California and Texas.

Related Subjects. The reader is referred to the following articles in these volumes:

Agriculture	Fruit
Burbank, Luther	Horticulture

Also, to articles suggested in the above references.

NUT, a fruit enclosed in a shell of woody fiber. The meat of this fruit is as a rule oily and exceedingly nutritious and is pleasant to the taste. Of late years increased attention has been paid to the food value of nuts. The oil is used for cooking, and prepared nut foods are numerous. The most valuable nuts include English walnuts, pecans, almonds, cocoanuts, hickory nuts, Brazil nuts, hazelnuts and chestnuts. In the United States and Canada the nuts having the most commercial importance are English walnuts, pecans, peanuts, almonds and chestnuts. California specializes in walnuts and almonds. Pecan orchards abound in the Southern states and in Southern California. In the South the acreage devoted to peanuts has been greatly extended within recent years.

FOOD VALUE
The black area represents the part of a nut that is food; the white section is the proportion of waste.

The meat of nuts is particularly rich in substances which promote energy. Fat constitutes the chief ingredient, and the percentage of protein is usually high (see Proteins). Some nuts contain nearly fifty times as much fat as wheat flour, and the average fuel value of a large number is over 3,000 calories per pound (see Calorie). The notion generally prevails that nuts are not easily digested, and there is probably some foundation for the prejudice against them. It must be remembered, however, that they are often eaten at the end of a substantial meal, when the stomach is already overburdened. In some parts of Europe nuts form a considerable part of the regular diet, bread being made from the ground kernels of chestnuts.

Related Subjects. The following articles should be read in connection with this subject:

Almond	Hickory
Brazil Nut	Peanut
Butternut	Pecan
Chestnut	Pistachio
Cocoanut	Walnut

NUTATION, *nu ta'shun,* an astronomical term, used to define a subordinate motion of the earth's axis, caused by the unequal attraction of the moon on the equatorial ring of the earth. The sun and the moon each exert an attraction, unequal in force, on the earth's surface. The result is to give to the earth two separate motions, one called *precession,* the other *nutation.* The greater the distance of the sun and the moon from the plane of the equator the greater is the change in the earth's motion. Gravitation, or attraction, has the effect of changing the relative position of the celestial equator, causing the celestial pole to describe a circle round the pole of the ecliptic once in 25,800 years. This rotation is subject to slight variations or vibrations, called nutation.

NUT'CRACKER, a bird of the crow family, found in the mountainous pine regions of Europe and Asia, and so called because of its supposed ability to crack nuts with its bill. It is a small bird with a comparatively-long tail;

NUTCRACKER

its plumage is a mixture of light brown, white and black. The nutcracker feeds chiefly on the seeds of pine cones, and has the rather interesting habit of holding these in its claws while pecking at them. The American nutcracker is called *Clarke's crow.* The speckled, grayish-green eggs of this bird are laid in a nest hidden in the top of a tall pine tree.

NUT'HATCH, the name of a group of climbing birds, common throughout the temperate regions of North America and Europe. Nuthatches receive their name from their habit of wedging nuts into crevices in the bark of trees and then "hatching" them with repeated strokes of the bill. The best known American species is the *white-breasted* nuthatch, a bird about six inches long. As its name indicates, the under parts are white; above, the bird is bluish-ash, with black, blue and white wings and black neck. These nuthatches are shy in summer and keep to the deep woods, but in winter they are commonly seen about houses and orchards, where food is likely to be found. They feed chiefly on insects. In climbing, they do not move upward, braced by their tails, as do other climbers, but zigzag in every direction, often head downward. They have a peculiar wavering flight, which helps them to evade birds of prey. They build their nests in holes in trees or stumps. The eggs are from four to eight in number and are white or creamy in color, speckled with reddish-brown or lavender. Other prominent American species are the *red-breasted* and *brown-headed* nuthatches, both of which are smaller than the white-breasted.

THE NUTHATCH

NUT'MEG, the kernel of a tropical fruit, which is extensively used as a spice. When ripe the fruit looks like a golden-yellow pear hanging among shiny, gray-green leaves; the nutmeg tree grows from twenty to thirty feet in height and is a bushy evergreen. Although the trees originally grew in the Spice Islands, they have been successfully cultivated in all of the East Indies, the West Indies, Brazil, Ceylon and India. Their long, pointed leaves have well-marked veins, while the pale yellow flowers hang in drooping clusters, much resembling lilies of the valley. As the fruit ripens, the fleshy part becomes rather hard, somewhat like candied fruit, and finally splits open at the top, disclosing a bright scarlet membrane, which partly covers the nut. From this membrane is obtained the spice called *mace* (which see),

while the kernels within, the familiar household nutmegs, after being dried in an oven, are packed and shipped as spice to all parts of the world.

Although the trees do not begin bearing until they are about nine years old, they have heavy crops after they start, for each tree produces

DETAIL OF THE NUTMEG

(*a*) Nutmeg covered with mace; (*b*) same, with mace removed; (*c*) cross section of nutmeg; (*d, e*) mature fruit in shell; (*f*) ovary.

about five pounds of nutmegs and one and one-half pounds of mace yearly. In countries where the tree is raised, the fleshy part of the fruit is often preserved and eaten as a sweetmeat, while a transparent oil, called *oil of mace,* is obtained from the kernel. Singapore, the largest market, exports about 1,500,000 pounds of nutmegs and 500,000 pounds of mace every year. About $375,000 worth of nutmegs are imported into the United States in a year.

"The Land of Wooden Nutmegs." Connecticut was given this nickname in its early days, because some enterprising but dishonest Yankee tradesman in that state engaged in the manufacture of so-called nutmegs made out of various kinds of wood, which they sold for the genuine article, until the deceit was discovered.

NUTRITION, *nu tri' shun.* Human nutrition includes all the processes by which the human body absorbs food, water and the oxygen of the air, builds them into its living tissues and uses them for fuel. The substances which it needs for these purposes are many and varied. They may all, however, be grouped for purposes of discussion under four heads: (1) building materials, (2) repair materials, (3) materials needed to keep the bodily machinery in good running order, and (4) fuels. These four groups of substances may be compared with the following materials used by a lifeless machine, such as locomotive: (1) those used in its original construction—steel, copper, brass and others, (2) those used in replacing its different parts as they wear out, (3) those used in cleaning and oiling it, and (4) the coal, gasoline or other fuel used to operate it.

The Human Body like a Steam Engine. The human body resembles the steam engine in many ways. For instance, it consumes fuel in the form of fat, sugar and other combustible food materials and uses the energy thus obtained in doing work—in lifting its own weight against the force of gravity, as in walking, running, or going upstairs, and in overcoming resistances of many other kinds. It has, however, at least one very great advantage over a lifeless engine, for it possesses the power of growth and of self-repair. Imagine a locomotive small enough to be used as a plaything and yet so perfectly built that it can consume coal and move toy cars. Now suppose that with the coal which is daily supplied there are purposely mixed small amounts of steel, brass, copper and other metals in such form that the engine can absorb them and make them parts of itself. Under these conditions it could, while doing its own work, increase in size and strength till it reached the proportions and power of an ordinary-sized locomotive. Go a little further and imagine that, having attained full size, it can mend its various parts as they wear out, just as it originally enlarged them, by selecting the necessary materials from the fuel supplied to it. The formation of a picture like this helps a person to understand the processes of nutrition in the human body.

From the moment of birth a child consumes fuel, obtaining it during the first day or two from its own body, but later from its mother's milk or other food. At the same time its body selects from the food certain building substances and uses them to enlarge and to strengthen itself. Like the locomotive of our imagination, it has the power to change itself from a small to a large machine without at any time being put out of commission. It follows, however, that if it is to exercise this wonderful power—that of working and growing at the same time—it must be supplied with fuel from which it can obtain not only energy but also the materials needed to make the various parts of its working machinery—its muscles, tendons, nerves, bones and teeth, to mention a few out of many.

The Needs of the Body. The right proportions for the food of babies are now definitely understood, for the chemical analysis of mother's milk supplies the formula. For the food

of older children and grown people there is no such accurate rule. Instinct, to be sure, leads people to take food and thus to maintain their lives. For the savage, who leads a care-free existence, this is sufficient guide, for he is not inconvenienced by being obliged to carry around with him more food than he needs. With civilized man, however, who plans his life carefully, the case is different. He wants the largest possible amount of energy for his work and his pleasurable pursuits and is unwilling to expend any of it carrying about or digesting substances which are of no use to him. For this reason, if for no other, educated people are making careful studies of bodily needs and of the nature of various kinds of foods, and are bringing together the facts thus discovered to form a science of human nutrition.

This science is comparatively new, and is even less developed than most sciences, but it includes a few well-proved facts which have been established by careful, painstaking studies in public and private laboratories. It includes also reliable statistics about the rate at which healthy children grow, the relation between the height and the weight of healthy grown people, and the general signs of bodily well-being. This growing science, or system, of classified knowledge and of proved facts is, among intelligent people, rapidly taking the place of those statements about food and diet which are based only on guesswork.

One fact which has been definitely established concerns the amount of energy needed by people of different ages and occupations. This was determined by measuring the heat produced by these people in a given length of time, for, of course, the greater the energy expended, the more the heat produced. The studies were made with a piece of apparatus called a *calorimeter,* or heat measurer, first used in America in the United States Department of Agriculture, and later in the Carnegie Institution, the Russell Sage Research Laboratory, and elsewhere. Though difficult to make and to operate, a calorimeter is simple in theory. It consists of a room or enclosed space so built and insulated that no heat can escape through the walls or in any other way except where it can be measured. It is supplied with an inlet and an outlet for air, and also with a coil like an ordinary steam radiator, through which water continually circulates while the experiment is going on. All the heat given off in this room passes either to the air or to the water in the coil and can be accurately measured. By this means the heat output, and therefore the energy requirement of different people, has been determined when they are lying down, sitting, standing, running, and doing many different kinds of work.

Heat Given off in Physical and Mental Work. The amount of heat given off daily by a man of average weight doing moderate muscular work is about enough to raise seven and one-half gallons of water from freezing to boiling temperature. Investigators need more accurate forms of statement than this and have agreed to give the name *calorie* to the amount of heat necessary to raise one kilogram (a little more than a quart) of water from 0° to 1° Centigrade, or from 32° to 33.8° Fahrenheit (see Calorie). A man at moderate muscular work gives off about 3,000 calories; a woman weighs about eight-tenths as much as a man, and if she is equally active needs about eight-tenths as much fuel. The energy required by children depends partly on their weight and partly on the degree of muscular activity. Little children need far less than grown people, but an active boy over fourteen years of age may need as much as a man who leads a sedentary life. By experiments with the heat measurer, it has been shown that mental work does not increase the amount of fuel consumed. A person gives off no more heat when trying to solve a difficult problem than when his mind is quite unoccupied, provided, of course, that muscular activity is the same in both cases. A person who does only mental work most of the time uses up, therefore, less energy than a manual laborer, and for this reason he needs less food, even though he may spend an hour or two every day at tennis, golf or any other form of active exercise.

How much food does it take to provide the amount of energy needed by the laboring man, the student, the clerk, or the child? That depends upon the kind of foods taken. The amount of heat produced by the different foodstuffs when they burn—by eggs, for example, or by bread or by butter—and consequently the amount of energy stored in them—has also been determined by experiments with the calorimeter, or heat measurer. By this means it has been found that all foods have different fuel values. A pound of butter yields about three times as much heat as a pound of bread, about eleven times as much as a pound (or a pint) of milk, twelve times as much as a pound of apples and forty times as much as a pound

of lettuce. Or, expressed in a different way, fuel enough for a man at moderate muscular work could be obtained from about fourteen ounces of butter, but it would require over two and one-half pounds of bread, nine and one-half pounds of milk, ten and one-half pounds of apples, or thirty-five pounds of lettuce. These are but a few of the figures which might be given, for the fuel value of practically every known food material has been determined and is recorded in the publications of Departments of Agriculture and in many textbooks.

Fuel Value of Different Foods. The great differences between the fuel values of foods are to be accounted for in two ways: First, some foods contain far more water than others, and water, of course, cannot be burned. Lettuce, for example, is nine-tenths water, while wheat flour is only one-tenth water. Some foods, particularly those that are manufactured, like cane sugar and salad oils, contain no water. Second, the burnable material in different foods differs widely in character. It may be sugar, starch, fat or protein, or a mixture of two or more of these, in any proportions. Fat has two and one-fourth times the energy value of any of the others, and for this reason its presence in a food material contributes more to fuel value than the presence of the same amount of any other nutrient.

A given amount of energy, whether that needed by the manual laborer or the professional man, could of course be obtained from one food material or from any one of an almost unlimited number of combinations of materials —from bread alone or from bread and butter, or from bread, butter and sugar. People instinctively eat many different kinds of food, however, and investigators are trying to discover the reasons for this. They have noted the effect of different kinds of diet on growth, health and working capacity. In addition, they have studied the character of the substances produced by the burning of various kinds of foods in the body, with a view to getting a clue to the character of the foods themselves.

It is plain, of course, that matter must be constantly passing off from the body, or even an adult would increase very rapidly in weight, for the average person takes into his body several pounds of food, water and oxygen every day. Investigation has shown that there pass off daily through the lungs and the skin very large amounts of carbon dioxide and of water. The former is always produced when substances containing carbon, and the latter when substances containing hydrogen, are burned. Much of the water given off enters the body as such, but the amount excreted is more than can be accounted for in this way. Part of the water, therefore, and all of the carbon dioxide excreted are considered to be products of the burning sugar, starch, fat and other compounds containing carbon and hydrogen.

Urine, another waste product, contains not only a large amount of water but also many solid substances in solution. The chief of these, so far as amount is concerned, is urea, which contains not only carbon, hydrogen and oxygen, but also nitrogen, an element absolutely indispensable to life. Urea is present even in the urine of a fasting person, which indicates that it must be produced by the destruction of the tissues and that nitrogen in some form is a necessary ingredient of repair material. Analysis of food materials shows that nitrogen is not present in starch, fat or sugar, but only in a class of compounds known as proteins. These are found most abundantly, as compared with other fuels, in milk, cheese, eggs, flesh foods, legumes (beans, peas and lentils), and some of the nuts.

The "Building Stones" of the Body. The amount of fuel which should be in the form of protein is still a matter of debate. A few facts will serve to show the kind of problem involved. The nutrients (fats, sugar, starch, protein and others) are extremely complex substances. They break up, however, during the process of digestion, into much simpler compounds. Some of these simpler compounds are fit only to be burned and to provide energy. Others are suitable to be absorbed into the living tissues and to serve as part of the mechanism of the body. They are in time, to be sure, themselves cast out and replaced by other similar compounds, but in the meantime they have fulfilled a most important mission. The substances thus capable of becoming part of the living organism and of contributing to its strength are sometimes called, even in scientific literature, the "building stones" of the human body. They are many and varied, some being suitable to enter into muscle tissue, others into cartilage, bones, nerves, etc. The proteins of the foods which supply many of the most indispensable of these "building stones" are also varied, those in meat, for example, differing from those in eggs, milk, nuts and flour just as the proteins of these substances differ among themselves.

Neither the total building and repair material needed in a given length of time, nor the exact amount of the various "building stones" which make up the total, is at present known. It is probable that the amount required for health is more than that which actually becomes a part of the living tissues and that a certain amount of reserve material must always be on hand to be used in case of need. Another fact still to be determined is the exact nature of the "building stones" obtained from the different kinds of protein. Some may in time be shown to be better suited for muscle building, some for nerves, and so on. In spite of these uncertainties, certain limits of safety have been agreed upon by most investigators, and it is thought that unless milk, eggs, flesh foods, cheese, nuts or dried legumes enter into the diet there will not be enough nitrogen-containing "building stones" for growth and for repair.

Milk a Unique Food. Among these protein-rich foods, as they are called, milk has a unique position because of its large percentage of lime, a substance needed for bones and teeth. These hard parts of the body, once built, undergo little change; they do not, like the muscles, cast off old material rapidly and take on new. Lime is therefore needed in larger quantities by young people in proportion to their weight than by grown people. While grown people may therefore choose at will from among the protein-rich foods, and according to their likes and dislikes, children must always have milk—at least so the science of nutrition in its present state of development indicates.

Mineral Substances in Food. Urine always contains, besides urea, certain other compounds which contain elements usually classed as minerals. The presence of these compounds also is thought to be due to the breaking down of the tissues and to indicate the need of mineral substances in the food. Such substances, particularly iron, are found in fruits and vegetables in great abundance as compared with total fuel. These food materials should therefore be part of the diet of all, old or young. In the case of children past infancy, who still take most of their protein in the form of milk, they are especially necessary, for milk is conspicuously lacking in iron.

Material passes off from the body also in the form of *faeces.* This material has been found to resemble in one way at least, the ash of coal, for it contains in unburned form some of the original fuels of the body—fat, starch, protein and others. In other ways it differs from the coal ash, for many of its constituents can be decomposed by bacteria, some of which are swallowed with the food (see BACTERIA AND BACTERIOLOGY). This process has its normal and healthy, and also its abnormal and unhealthy, aspects. To prevent undesirable kinds of decomposition, the food should move on at a certain rate through the digestive tract. This is supposed to be accomplished partly by the presence in the food of *cellulose,* or fiber, found in all vegetable foods, and partly by the mild vegetable acids found in most fruits and many vegetables. Vegetables and fruits are therefore a valuable source of the third group of materials mentioned early in this article—those necessary to keep the body in good running order.

Vitamines in Food. One of the most interesting of the recent advances in the science of nutrition is the discovery in natural foodstuffs of minute quantities of certain substances, called *vitamines,* which are thought to have no nutritive value of their own but help the body to make good use of foods obtained from other sources. Little is yet known about the nature of the action of these substances, but some of them seem to be growth-promoting, and therefore especially needed in childhood, while others regulate body processes in general and are needed throughout life. Vitamines may probably be destroyed by heat, but the amount of heat which they can withstand is not yet known. It is now thought that there should always be in the diet some foods in which the vitamines are still active—uncooked milk, for example, or fresh fruits or vegetables, or the outer coatings of grains. When fruits and vegetables are lacking, foods made from whole cereals are especially recommended, and when milk given to a young child must, for safety's sake, be heated, the needed vitamines are often supplied in the form of orange juice. There is at present no reason to suppose that they must be in every food that is eaten.

Relation of Flavor and Taste to Nutrition. Studies are also being made of the relation of flavor, and of taste in general, to nutrition. The taste of food depends not only on flavor but also on consistency. To most people the diet is more pleasing and therefore more satisfactory if part of the fuel is supplied in the form of sugar and part in the form of fat. There are probably physiological reasons also why these should be present. Sugar is far more quickly absorbed than other nutrients and re-

quires less energy for its digestion. This makes it especially desirable at times of great muscular strain, like forced marches. A person may eat larger amounts of sugar when camping out and exercising vigorously than when sitting at a desk and doing brain work all day.

Food Groups. Enough has been said to indicate that the diet should be made up of a large variety of food materials, the total amount for a given individual depending upon his weight and muscular activity. Further progress in the science of nutrition will doubtless point to the necessity of still greater variety, particularly if the proteins of different foods (meats, eggs, legumes, cereals, etc.) are shown to have different uses. For the present, however, the very large number of food materials available for human food may for convenience be grouped under the following five heads:

Group 1. Food in which fuel in the form of *protein* is greater in proportion to total fuel than in the diet as a whole, i. e., milk, flesh foods, eggs, cheese, legumes and some of the nuts. These are especially helpful in supplying nitrogen-containing building material.

Group 2. Foods in which the greater part of the fuel is in the form of *starch,* i. e., wheat, corn, oats, barley and other cereals, and potatoes. Cereals form the largest single item in the diet of people everywhere, doubtless because they are widely distributed in nature and easily raised. They appear on the table chiefly in the form of bread, but also in forms suitable for breakfast foods, desserts and side dishes with meat or eggs.

Group 3. Foods in which the greater part of the fuel is in the form of fat, i. e., butter, cream, salad oils and fat meats. These are necessary if for no other reason than to give the diet a desirable consistency. They have so high a fuel value, however, that they must be judiciously used by those who plan their lives carefully and desire to keep their diet within safe limits.

Group 4. Fruits and vegetables, including spinach, lettuce, carrots, oranges, apples, berries and many others. These are necessary to keep up the supply of mineral matters, particularly iron, vitamines, organic acids, cellulose and other substances which regulate body processes.

Group 5. Foods in which most of the fuel is in the form of *sugar,* i. e., sugar itself (cane or maple), honey, dried fruits, and others. These supply a form of fuel which is quickly absorbed and utilized.

The needs of the body as indicated by observation and experiment are probably satisfied if the diet contains representatives of all of these groups of foods, providing that in the case of the child no other protein-rich food is allowed to take the place, to any great extent, of milk. See, also, MEDICINE AND DRUGS; FOOD; HEALTH HABITS; LIFE EXTENSION. C.H.

Bills of Fare. The following bills of fare illustrate the points noted above as to properly balanced rations:

Bill of Fare No. 1

		Protein Grams	*Fuel Value Calories*
Breakfast:			
Baked Apple	4 ounces	..	128
Cooked Oatmeal	¾ cupful, 6 ounces, or 170 grams	5	110
Cream	¼ cupful, 2 ounces, or 57 grams	1	115
Milk	½ pint, or 244 grams	8	170
Toast	2 slices, 2 ounces, or 57 grams	5	148
Butter	⅔ cubic inch, ⅓ ounce, or 9 grams	..	72
		19	743
Lunch:			
Split pea soup	½ cup, 4 ounces, or 113 grams	11	242
Crackers	1 ounce	3	123
Nut bread	2 ounces	5	172
Butter	1 cubic inch, ½ ounce, or 14 grams	..	108
Milk	½ pint, or 244 grams	8	170
Stewed prunes	6 ounces, or 170 grams	1	160
Sponge cake	2 ounces, or 57 grams	4	218
		32	1194
Dinner:			
Cheese Fondue (Baked cheese, eggs, etc.)	3½ ounces	12	202
Celery	1 ounce	..	5
Jelly	1 ounce, or 28 grams	..	76
Green peas	1½ ounces	2	24
Bread	2 slices, 2 ounces, or 57 grams	5	149
Butter	1 cubic inch, ½ ounce, or 14 grams	..	108
Ice Cream	¾ cupful, 6 ounces, or 170 grams	7	406
Macaroons	1 ounce	2	120
		28	1090
Total		79	3027

Bill of Fare No. 2

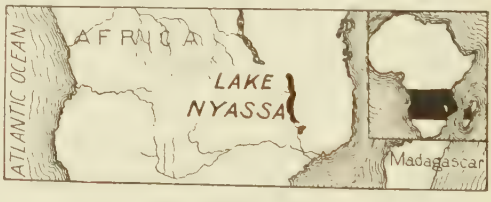
		Protein Grams	Fuel Value Calories
Breakfast:			
Strawberries	1 cupful, 4 ounces, or 113 grams	1	44
Wheat breakfast food (One ounce before being cooked)	½ cupful, 4 ounces, or 113 grams	3	102
Milk	½ pint, or 244 grams	8	170
Toast	2 thick slices, 2 ounces, or 57 grams	5	148
Butter	1 cubic inch, ½ ounce, or 14 grams	..	108
Sugar	2 level tablespoonfuls, 1 ounce, or 28 grams	..	112
		17	684
Lunch:			
Macaroni and cheese	½ cupful, or 4 ounces	15	273
Bread	2 ounces, or 57 grams	3	148
Butter	1 cubic inch, ½ ounce, or 14 grams	..	108
Lettuce	2 ounces, or 57 grams	1	11
Oil	1 tablespoonful, or 15 grams	..	135
Sliced oranges	½ cupful, 3 ounces, or 35 grams	..	40
Sugar	2 level tablespoonfuls, 1 ounce, or 28 grams	..	112
Plain cake	2 ounces, or 57 grams	4	190
		23	1017
Dinner:			
Cream tomato soup	½ cupful, 4 ounces, or 113 grams	4	102
Crackers	1 ounce, or 28 grams	3	123
Eggs or lean meat	4 ounces, or 113 grams	14	146
Potato	1 medium size, 4 ounces, or 113 grams	2	94
Bread	2 ounces, or 57 grams	5	148
Butter	½ ounce, or 14 grams	..	108
Cooked spinach	½ cupful, 4 ounces, or 113 grams	2	63
Apple pudding	½ cupful, 4 ounces, or 113 grams	3	183
Hard sauce	2 level tablespoonfuls	..	142
Milk	½ pint, or 244 grams	8	157
		41	1266
Total		81	2967

Related Subjects. For much information which will be interesting and helpful in connection with a study of nutrition, the reader is referred to the article FOOD, and to the topics listed at the end of that article.

NUX VOMICA, *nuks vom' i ka,* the seed of a tree called *Strychnos nux vomica,* or *poison nut.* It is imported from the East Indies, is round, flat, about an inch in diameter and covered with fine, silky hairs. A very powerful drug, called by the same name, is made from the seed, which contains two alkaloids—*strychnine* and *brucine.* The drug nux vomica is poisonous to animals, and also to man, in anything but very minute quantities. In small doses it is occasionally given as a stimulant in stomach and nervous disorders; in large quantities it causes convulsions and even death, and should never be taken except on the advice of a reliable physician.

NYASSA, *nyah' sah,* a great fresh-water lake in Southern Africa, near the eastern coast. It is over 350 miles long and about forty miles wide, a gigantic, slant-bottomed ditch at the foot of the Livingston Mountains. The lake covers an area of 14,200 square miles, greater than that of Maryland and half that of New Brunswick. The western side is very shallow, but the eastern, at the foot of the mountains, is in places deeper than the Indian Ocean.

Nyassa was first explored by Dr. Livingston in 1859, though it had been known to the



LOCATION MAP

The small corner map shows in black area the part of the African continent represented in the larger map.

Portuguese as *Moravia* since the seventeenth century. The African Lake Company has a regular steamship line crossing the lake and a highway connecting it with Tanganyika. There are a few native villages along the highway and the lake shore, to which the people bring rubber, copal gum and lichens. The Shire River connects Nyassa with the Zambezi and thus with the ocean, but navigation is interrupted by Murchison Falls and rapids; there is a fall of 1,500 feet from the surface of the lake to sea level.

NYE, *ni,* Edgar Wilson (1850-1896), an American humorist, popularly known by his pen name, Bill Nye. When he was two years old his parents removed from Shirley, Me., his birthplace, to a farm in northern Wisconsin, where the boy attended the River Falls Academy and fitted himself to be a lawyer. He was admitted to the bar in 1876 at Laramie, Wyo., and in that place he served as postmaster, justice of the peace, superintendent of schools and a member of the city council. He became widely known through his witty newspaper articles and other writings, the humor of which depended to a great extent on his skill in punning and taking other liberties with the language. He also gained great popularity as a lecturer. In 1885 he accompanied James Whitcomb Riley on a tour of the United States, each giving readings of his own composition. Nye's later life was spent in North Carolina. Among his writings are *Bill Nye and the Boomerang, Forty Liars and Other Lies* and *Bill Nye's History of the United States.*

NYMPHS, *nimfs,* in mythology, lovely maidens possessed of eternal youth, who guarded the different realms of nature. *Oreads* watched over the hills and mountains; *Nereids,* the sea; *Oceanids,* the ocean; *Dryads* and *Hamadryads,* the trees; and *Naiads,* the rivers, brooks and springs. Although of divine birth, only the Oreads and Naiads were immortal. They are usually represented as playing with the fauns and satyrs in the forest, clustering around the keels of ships, or living in trees. Generally they were kind, but occasionally when a mortal had injured anything under a nymph's protection, they showed themselves vindictive. They were very shy and usually fled from the approach of mortals, though, being only half divine, they are represented as marrying men as often as gods. Lowell's *Rhoecus* gives a charming story of a nymph.

Oo

O, the fifteenth letter in the English alphabet, and the fourth of the vowels. The Phoenician alphabet had a letter which in form was like the capital *O*, and was called *ayin*, meaning *eye;* but, like all the Phoenician letters, it was a consonant. Just what sound it represented is not known, but it must have been some sound which the Greeks did not possess, for when they took over the alphabet they used the letter form to represent the sound of *o* in *no;* perhaps this use was suggested to them by the rounding of the lips in giving that sound. At first the Greeks had only one *o*, but later they developed another, and called one *omicron*, or little *o*, and the other *omega*, or great *o*. The former stood for the short *o*, which was not like the sound known in English as short *o*, but was merely a shortened form of the long *o* sound.

In English, *o* is made to do duty for a number of sounds. The most important are the long *o* sound, as in *note*, which resembles the sound of *o* in continental languages; and the so-called short *o* sound, as in *not* and *log*. This is in reality not an *o* sound at all, but approaches very closely the *a* sound in *father*. Other values are the *oo* sound, as in *prove*, and the *u* sound, as in *love*. In certain words it has an obscure sound, and is, indeed, almost neglected in pronunciation, as in *season*.

OAHU, *o ah' hoo,* the most fertile of the Hawaiian Islands, and the one which ranks first in importance. It contains Honolulu, the capital of the territory of Hawaii, and Pearl Harbor, the site of the most favorably located of United States naval stations. It is nearly a rectangle in form, and covers an area of 600 square miles; in 1920 it supported a population of 123,496. Oahu is remarkable for its beautiful scenery—a combination of volcanic peaks and fertile valleys, cliffs, crags and mountain torrents, wooded ravines and tropical vegetation. See Hawaii.

OAK, called by Dryden "the monarch oak, the patriarch of the trees," has for ages been a symbol of sturdiness and of the strength which defies time and tempest. Many poets have sung of the "hearts of oak" of their countrymen, and they have encouraged mankind in its struggles with the reminder that "tall oaks from little acorns grow." A favorite poem of the children, written by H. F. Chorley, tells the virtues of this tree in picturesque phrases:

A song to the oak,
The brave old oak,
Who hath ruled in the greenwood long!
Here's health and renown
To his broad, green crown,
And his fifty arms so strong!
Here's fear in his frown
When the sun goes down
And the fire in the west fades out;
And he showeth his might,
On a wild, stormy night,
When the storms through his branches shout.
Then here's to the oak,
The brave old oak,
Who stands in his pride alone;
And still flourish he,
A hale, green tree,
When a hundred years are gone!

It is the acorn which distinguishes the oak from other trees. The acorn is the oak seed; it is like a round, smooth-shelled nut, pointed at its outer end and enclosed at the inner end by a saucer, or cup. Most oaks can be recognized by their leaves, but the *live oak* and the *ilex* and some other varieties have a smooth-edged leaf. Oaks grow slowly, and do not yield

acorns until they are twenty years old. The nuts are sometimes sweet, sometimes very bitter. In the south of Europe they are boiled and eaten; elsewhere they are seldom consumed by human beings, but from earliest times have been fed to swine.

Oak timber has served mankind for many centuries. In Westminster Abbey stands the shrine of Edward the Confessor, the oak of which it is built still apparently as sound as it was nearly 900 years ago. Aside from the rare woods like mahogany, rosewood and ebony, oak is equaled in weight only by hickory, and, as it is much more plentiful and more easily worked than the last named, it has no rival among hard woods. It rots very slowly, even if subjected to alternate dampness and drying. For shipbuilding it was the principal material before the day of steel. To-day it is prized most of all for its beauty, especially when quarter-sawed. Accompanying the article LUMBER will be found diagrams illustrating methods of obtaining quarter-sawed oak.

In England, where in the days of the Druids oaks were held sacred, there are some trees still thriving which may have been seen by the Saxon kings. One in Gloucestershire has a circumference of nearly forty-eight feet; it has no near rival in size. Two or three centuries is the usual life of an oak.

The oak family is known in many lands. From the Malay countries and China westward across the Himalayas and the Caucasus, and throughout most of Europe from Sicily to the Arctic Circle, it is familiar. In North America it is found almost wherever there are trees, except in the regions of great cold, and its pathway extends southward into the Andes. The oak of England is very similar to the American white oak. The ilex of Southern Europe is an evergreen, like the moss-hung live oak of the American South.

Among American species the noblest is the *white* oak, which sometimes attains a height of 150 feet and a trunk diameter of eight feet. Its bark is pale gray, and it bears leaves with round or finger-shaped lobes, whose deep red color adds charm and beauty to our autumn landscapes. The white oak is found from Canada to the Gulf of Mexico and westward to

Texas. In the dense forests it grows narrow near the crown, but in the open it is a wide-spreading tree, truly typical of strength and dignity. The wood of the white oak is hard and close-grained, and is valued for its strength and durability. The rugged *bur,* or *mossy-cup,* oak, which has about the same distribution as the white oak, is a picturesque tree for parks, with its irregular crown, deeply-furrowed bark and shaggy spreading branches. The leaves are very long and have deep lobes. This tree is grown both for shade and for lumber.

Another prominent American species is the black oak, found growing from Maine to Florida and west to Minnesota, Kansas and Eastern Texas. The leaves of this tree have broad, bristle-tipped lobes, and their outer

DESIGNS FOR A BOOKLET

The illustration at top is intended for the cover decoration; the smaller pictures should be used on inside pages.

surface is a lustrous dark-green color in summer; in autumn they turn brownish-yellow. The tree itself does not usually grow higher than ninety feet. Its bark, a distinguishing feature, is very dark gray or brown, with orange-yellow inner layers, which are rich in tannin. A handsome ornamental tree, common in Eastern United States, is the *red* oak, whose grayish-brown bark has a red tinge. The leaf lobes are irregularly-toothed, bristly-pointed and triangular in shape, and they point forward more than outward. The inner layers of the bark are red, and the timber is much used for building purposes and for furniture. The *live* oak, which is a favorite avenue and park tree in the Southern states, has something of the appearance of an apple tree, with its thick, short trunk and long, horizontal limbs. The leaves of the live oak are not so showy as those of its Northern cousins, as may be seen by the illustration, but its draperies of moss give it a charm that few other trees possess.

For most purposes the timber of the English oak is considered the strongest and most durable, as well as the most beautiful, though it is very little better than the American white or red oak. The live oak was once the favorite for shipbuilding. Besides timber, oaks yield tanbark, and, in Spain and Portugal, cork.

Celebrated in American history is the Charter Oak, in Hartford, Conn., which sheltered the charter of the Connecticut colony for two years.

C.H.H.

Related Subjects. The reader is referred to the following articles in these volumes

Charter Oak
Cork
Forests and Forestry
Lumber
Tanning

OAK'LAND, CAL., the third largest city of the state, ranking next to Los Angeles and San Francisco, and the county seat of Alameda County, is a residential city on the landward side of San Francisco Bay. Six miles west across the bay are San Francisco and the Golden Gate; eighty-six miles northeast is the state capital, Sacramento. During the ten years from 1910 to 1920 the population increased from 150,174 to 216,361 (44 per cent gain).

Location. Oakland, which has an area of nearly fifty square miles, and Berkeley, a city adjoining it on the north, are situated on land sloping west and south from the hills of the Coast Range. Oakland has twenty-seven miles of deep-water frontage and is a port of trans-pacific steamers. Between the city and Alameda, a large island to the south, occupied by the city of that name, is an estuary of the bay affording those cities an inner harbor more than five miles in length. A channel thirty feet in depth has been dredged by the United States government, which makes the estuary accessible to large boats for a distance of thirty miles. West of Oakland, moles extend for two miles into the bay and shorten the trips which ferries constantly make to San Francisco. The city is on the Southern Pacific, the Western

Pacific, the Atchison, Topeka & Santa Fe and the Oakland, Antioch & Eastern (electric) railroads, and is connected with the surrounding cities and with towns of the interior Sacramento and San Joaquin valleys by electric lines.

Parks and Boulevards. Both nature and man have done much for Oakland; wooded hills, the bay, a luxuriant growth of semitropical vegetation, and wealth and taste have combined to make it a beautiful city. Lake Merritt, six blocks from the business section, is a salt-water lake covering 160 acres, connected by an inlet with the bay. It is surrounded by Lakeside Park, broad avenues and handsome residences. There are about thirty other parks, together valued at $3,500,000. Highland Drive and Foothill Boulevard are two of many scenic roads of the city and vicinity which are a part of the excellent system of state and transcontinental highways.

Buildings and Institutions. Conspicuous from every part of the city is the $2,000,000 city hall. The Municipal Auditorium, which cost $1,000,000, is a popular convention headquarters. Other buildings of note are the Federal building, erected in 1903 at a cost of $200,000; Y. M. C. A. and Y. W. C. A. buildings, hotels Oakland and Claremont, a Carnegie Library, men's and women's club buildings, including the Nile, Ebell, Athenian, Elks and Masonic Temple, moving picture theaters and many fine churches. The city has Saint Mary's College (Roman Catholic) for men; California College (Baptist), coeducational; Mills College, nonsectarian, for women; a Chinese College and a number of private schools. At Berkeley is the University of California. There are more than a dozen hospitals, and the city has the state industrial home of mechanical trades for the adult blind.

Industries. Oakland is situated at the outlet of a wide agricultural and fruit-growing belt, and by reason of unexcelled shipping facilities controls a large commerce. It is also near the discharge tanks of pipe lines from great oil fields and obtains fuel for manufacture at a low cost. In 1920 the city had 593 manufactories, capitalized at $118,882,000. They included shipbuilding yards, smelting and metallurgical works, flour and planing mills, printing and publishing houses, fruit-canning factories and manufactories of building materials, chemical products, foundry and machine-shop products and textiles.

History. In 1850 a settlement at Oakland was made by "squatters" when the land was still a part of a private Mexican land grant. It was chartered as a town in 1852, became a city in 1854, and was made the county seat in 1874. In 1910 the commission form of government was adopted; it provides for five officers, a mayor and commissioners of public works, public health and safety, streets and finance. Since 1908 the city has owned and controlled the wharfing privileges. Joaquin Miller's cottage, for many years his home, is not far from the city.

OAKUM, *o'kum,* originally the coarse part of flax, the portion left after the fibers had been smoothed and separated. The term is now applied to hemp fiber obtained by picking to pieces old tarred ropes. It is most commonly used to close the seams in the sides of wooden ships to keep them from leaking, a process known as *caulking. White oakum,* made from clean, untarred rope, is sometimes used in dressing wounds.

OASIS, *o a'sis,* any fertile spot in a desert region, sometimes only large enough to sustain the lives of a few people, at other times so extensive that two millions can live upon it. Generally the soil in deserts is fertile but lacks the moisture to help things grow, so in the places where springs, underground streams or wells furnish water, the oases spring up as bright spots in a dreary waste. The water from hills or mountains in the deserts often percolates through the fine rock waste down on the level, where much of it is held, sometimes forming small lakes. The oases in the North American deserts are mainly formed in this way, while those in the Sahara result from springs, underground streams or the proximity of mountains sufficiently high to cause the condensation and precipitation of moisture. Great tracts of land have recently been reclaimed in these vast wilderness regions, not only by the sinking of artesian wells, but also by irrigation from mountain streams (see IRRIGATION), so that artificial oases exist in many sections. In ancient times the most celebrated oasis was one in the Libyan Desert, called Siwa, 350 miles west of Cairo, where a splendid temple to Jupiter Ammon was built.

See illustration, with article DESERT.

OATH, in law, is a solemn pledge made by word of mouth before an authorized officer, by which a person swears or affirms that certain statements made by him are true. Oaths taken for use in legal proceedings, the violation of which constitutes the crime of perjury, are

known as *judicial* oaths (see PERJURY). A very important example of the judicial oath is that administered to witnesses in trials, where their testimony is necessary to prove certain facts. In taking the judicial oath the declarant may be required to lay his hand on the Bible and conclude the recital of the pledge with an appeal to God. The various forms of oaths are established by statute. The following form is typical of the oath administered to a person swearing to an affidavit:

You do solemnly swear that the contents of this affidavit by you subscribed are true, so help you God.

Affirmation. Members of certain religious sects, as the Quakers, do not approve of swearing by an oath because of their interpretation of the Bible's command, "Swear not," and for them provision has been made by allowing them to make a solemn declaration called an *affirmation,* which is, however, as binding as a formal oath. Another form of oath, known as *extrajudicial,* is one taken voluntarily and not with the intention of using it in a legal proceeding. Examples of this class of oaths are pledges made to abstain from tobacco and intoxicating liquors and oaths taken to show one's good faith in a private transaction. Such oaths are morally but not legally binding, and no penalties are attached to their violation.

Oath of Office. This is a pledge that officials are required to take on assuming the duties of a public trust. It consists of a promise to conduct affairs in a conscientious manner. The form of oath prescribed by the Constitution for the President of the United States is as follows:

I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will to the best of my ability preserve, protect and defend the Constitution of the United States.

The oaths for all inferior officers of the United States are similar to the above, with such modifications as are demanded by local requirements. They include a promise to preserve, protect and defend the constitution of the state in which the officer resides, as well as that of the nation. In Canada the usual oath of office of a government official is a pledge of faithfulness in the performance of his official duties, but all members elected to the Dominion Senate or the House of Commons and members of the legislative assemblies of the provinces are required by law to take the following oath of allegiance:

I do swear that I will be faithful and bear true allegiance to His Majesty * * * *.

Military Oaths are taken by men who enlist for service in the army. The form of military oath in the United States, taken or affirmed by every man within six days after enlistment, is as follows:

I do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; and that I will obey the orders of the President of the United States and the orders of the officers appointed over me, according to the rules and articles of war.

Soldiers in the service of Canada, Great Britain and other countries take a similar oath, but in Germany whole regiments are sworn in together by an impressive ceremony. M.K.

OATS, one of the most important of the world's agricultural products, classified by botanists among the grasses, in the same family as wheat, rye, barley, corn and rice; the scientific name of this grass family or order is *Gramineae.* There are nearly sixty varieties of oats under cultivation; differences in color, size, appearance of straw and form of seed are slight, and are due mostly to conditions of climate, time of ripening and soil qualities.

The origin of this grain is not positively known, but it is considered to be a development from wild grass of ancient times. Oats were not known at the beginning of the Christian Era, but soon after appeared in southern Europe, probably having been carried there from Asia, which is reputed to have been the first home of

UNITED STATES CENTERS OF PRODUCTION
The darkest sections represent the areas of heaviest yields.

this cereal. By the thirteenth century oats were grown in England and known there as pilcorn.

Sowing occurs in the spring, but the ground should be plowed in the preceding autumn, followed by harrowing soon after the frost is out of the ground. The seed is sown in drills or broadcast just as soon as the ground is in

proper condition, and from two to three bushels to the acre are generally used. The crop is harvested usually in July; differences in latitude vary the time of reaping a few weeks.

The oat stalk is from two to four feet long when full grown, is very slender and terminates in groups of graceful branches called spikelets,

Figures Represent Millions of Bushels

LEADING STATES AND PROVINCES

The figures represent the average annual yield during a period of five years.

at the end of which the grain is found encircled by protecting husks. Each spikelet produces two grains unequal in size. The color of the plant is light green before ripening and turns to a yellowish tint when ready for harvesting, although in a few varieties the color is brown. The average yield per acre in the United States is about twenty-seven bushels, but this is almost sure to be materially increased by the application of scientific methods of cultivation. In England and Germany the average yield per acre is nearly forty bushels. Oats are grown in practically every state of the American Union, but with less success in the southern

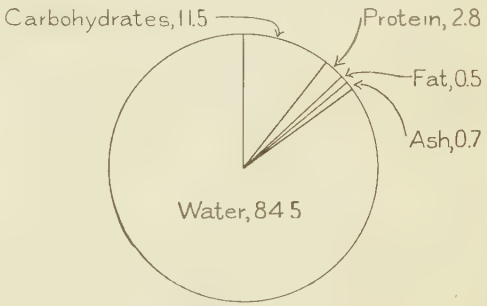
Figures Represent Millions of Bushels

FOUR LEADING COUNTRIES IN PRODUCTION

Figures are for average years before the outbreak of the War of the Nations (1914).

section than in the northern. The leading states in production are Iowa, Illinois, Minnesota, Wisconsin, Nebraska, Michigan and Ohio, in the order named. Canada raises large quantities in all provinces south of Hudson Bay, or about the 55th parallel of north latitude. Oats are stable products throughout the temperate zones of the entire world, even north well toward the Polar Circle, in such sections as are favored by mild winds and warm ocean currents. The product is extremely light in South America, but of constantly increasing importance in Australia.

Oats as Food. Because they contain large quantities of starch and other necessary food elements, oats in various prepared forms, especially oatmeal and rolled oats, are used largely on our tables and provide food of very nutritious quality. The food value of both the above breakfast dishes is about 1,850 calories per pound (see CALORIE; FOOD, subhead *Chemistry of Foods*), and much higher as a heat producer than the average food. Oats are therefore an important article for winter consumption, but should be little used in summer. Oatmeal preparations also have the added virtue of low cost. However, it is as a fodder



FOOD PROPERTIES OF OATMEAL

The fuel value of oatmeal is 1860 calories per pound. This fact makes it a valuable cold-weather food. It has twice the value of veal as a heat producer, and a third more than the best beef. However, it lacks other food qualities that these possess.

that the crop is principally valuable. They are the best of all grains for horses, as a builder of tissue being equal to corn and less heating. No other cereal produces straw of such excellent quality.

The oat crop of the world is nearly 3,000,000,000 bushels annually; of this amount the United States raises over one-third and at average prices receives for its crop about $200,000,000. Canada's 1915 crop was 520,000,000 bushels, a little more than in average years.

OB, or **OBI,** *o'be,* one of the largest rivers of Asia, rises in the Altai Mountains of Western Siberia and empties through a deep bay, the Gulf of Ob, into the Arctic Ocean. The river is almost two miles wide at its mouth, has a length of about 2,500 miles and drains an area of 1,125,200 square miles, over four times the

area of Texas. The Ob and its several tributaries have a combined navigable length of 9,000 miles. The stream flows through fertile and fairly populous districts, and though 100 miles from its mouth it is blocked with ice from October to June, in the summer it is the means of transporting grain, dairy products, stock, wool and meat produced in Western Siberia. By a system of canals the Ob is connected with the Yenisei and thus with the Lake Baikal region, and it meets the Trans-Siberian Railroad at Omsk.

OBELISK, *ob'e lisk,* a four-sided shaft, tapering toward the top, which usually has the shape of a pyramid. The obelisk was a characteristic form of monument of the ancient Egyptians, who erected numerous pillars of this type in honor of their sun god. In the sacred city of Heliopolis obelisks have been found in large numbers. These monuments were cut from solid granite by an interesting process. After the rough form had been chiseled out, three sides were polished. Then holes were drilled close together along the length of rock, and plugged with pieces of wood. Frequent moistening caused the wood to swell, splitting the stone from end to end. The fourth side was then finished off and the obelisk was ready to be floated down the Nile or dragged to its destination. Before erection it was inscribed with appropriate hieroglyphics. These inscriptions gave the titles and achievements of the dedicating ruler, and sometimes stated the length of time it took to complete the monument. It was customary to erect pairs of obelisks at entrances of temples.

There are in existence several obelisks of great interest. Cleopatra's Needles (described and illustrated on page 1417) were a pair of pillars erected at Heliopolis by Thothmes III. During the rule of the Ptolemies they were removed to Alexandria; later they were taken away from Egypt, one being placed on the Thames Embankment in London (1878), the other erected in Central Park, New York City, in 1881. Of the two obelisks before the temple at Luxor, dating from the time of Rameses II, one is still standing on the original site; the other is one of the glories of the Place de la Concorde, Paris. Another famous pillar, over 100 feet in height, is that of the Church of Saint John of the Lateran, in Rome. It was built by Thothmes III in the fifteenth century B.C., at Heliopolis, and carried to Italy by Constantine the Great, who had it set up in the Circus Maximus. In 1552 it was brought to its present site by Pope Sixtus V. The Lateran obelisk is the largest known. Besides those of Egypt, obelisks of smaller size have been discovered in the ruins of Nineveh and Nimrud.

OBERAMMERGAU, *o ber ahm'er gou,* a village in Upper Bavaria, forty-three miles from Munich, celebrated for the performance of the Passion Play representing Christ's crucifixion and ascension. Since the fifteenth century, every ten years, with but few exceptions, this play has been performed during the months of May and October, about six times each month. Almost the entire village is represented in the rôles, but the greatest honor that can come to any of the villagers is to be chosen for either the part of Christ or of the Virgin Mary; it is the prayer of every mother of Oberammergau, when she brings into the world a son or a daughter, that her child may thus be honored. The play has become a part of the very lives of the people, and just before the time arrives for them to portray the characters of the Bible story, they put aside their work of wood carving or farming and enter upon a period of spiritual preparation (see PASSION PLAY.)

O'BERLIN COLLEGE, a school for higher education, founded in 1833 at Oberlin, Ohio, and named in honor of the Lutheran educator Jean Frederic Oberlin (see below). Its founders, the Rev. John S. Shipherd and Mr. Philo Stewart, left their homes in Vermont and came westward for the purpose of establishing in the Mississippi Valley a school which should bring about results as far-reaching as those effected by Oberlin in Germany. The institution soon became a center of democratic ideals in education. It was one of the first American colleges to admit women on the same terms as men, and as early as 1835 the trustees voted to put up no barriers to students of the colored race. So far as known, the women of the class of 1841 were the first in the United States to receive a standard degree of Bachelor of Arts.

When the college was opened sessions were held only in the preparatory department, but regular college classes were organized the following year, and in 1835 the school of theology was established. In 1867 the Oberlin Conservatory of Music, one of the best music schools in America, became a regular college department. The Carnegie Foundation for the Advancement of Teaching placed Oberlin on the original list of schools fulfilling its require-

ments (see subhead under CARNEGIE, ANDREW). There is a student enrolment of about 1,750, and the faculty numbers nearly 175. The college has a library of 165,000 volumes.

Jean Frederic Oberlin (1740-1826), for sixty years pastor of a Lutheran church in the valley of Steinthal (stony valley), on the boundary between Alsace and Lorraine, devoted his life to helping a people who were lapsing into barbarism as a result of years of warfare. He taught them how to till the land and how to spin and weave, he had roads and bridges built, and he founded a bank where money could be borrowed without security or payment of interest. The more promising youths were encouraged to go to Strassburg to attend trade schools, and in the valley schools were established. Among these were schools for little children of the kindergarten age.

OBESITY, *o bes'i ti,* a term used in medicine to denote an excessive accumulation of fat in the human system. In the common acceptance of the term, obesity is not a disease, but it is a condition which causes more or less discomfort. The normal proportion of fat is from one-fifteenth to one-twentieth of the weight of the body, but this may vary without affecting the health. It is only when the accumulation of fat begins to affect the functions of the vital organs, especially the heart, that obesity becomes a disease. Obesity may occur at any period in life, but its effects are most frequently manifest after the age of forty. The chief causes are overeating, lack of exercise and indulgence in alcoholic beverages.

Corpulent people are often anxious to reduce their weight, and many plans for accomplishing this have been devised. They all, however, depend upon diet and exercise. Some diets exclude all fats and carbohydrates, that is, foods containing a large proportion of starch. Some authorities advocate the use of such acids as vinegar and lemon juice, but the excessive use of these is likely to injure the digestive organs. Exercise should be taken at such times as will best aid digestion. Without systematic exercise no dieting system will accomplish permanent reduction.

The following diet is suggested for those who wish to reduce their weight. For explanation of *calorie,* see that article, and reference there given:

Fuel value, 1,400 calories; ordinary requirements, 2,400 calories. The difference is to be made up by burning adipose tissue (fat).

Measure	Weight Oz.	Protein calories	Total calories
Breakfast:			
Orange, 1 large	9.5	7	100
Eggs, 2	4.8	54	150
Graham bread, 2 thin slices	.7	7	50
Coffee (clear), 1 cup	...	..	...
			300
Luncheon:			
Bouillon, 1 cup	8.5	21	25
Soda cracker, 1	0.2	3	25
Halibut steak, broiled with lemon, large serving	6.0	122	200
Asparagus, plain, 10 stalks	8.0	16	50
Potato, boiled, 1 medium	3.6	11	100
Butter (for potato and asparagus), ½ tbsp	0.3	0.3	50
Apple, raw, 1 medium	4.9	2	65
			515
Dinner:			
Raw oysters, 12	7.2	49	100
Roast beef, strictly lean, large serving	5.8	162	250
String beans, plain boiled, ½ cup	2.0	5	25
Potato, boiled, 1 medium	3.6	11	100
Tomato, sliced with vinegar, salt, and pepper, 1 medium	7.7	..	50
Cheese, pineapple, Swiss, Brie, Roquefort, or American	0.4	12	50
Water cracker, 1	0.1	1	10
Coffee (clear), 1 cup	...	..	...
			585
Total for day	491		1,400

While some people are too fat, others are too thin. Many women, especially, desire to increase their weight, and the following diet is suggested for this purpose:

Fuel value, 3,000 calories; ordinary requirement, 2,200 calories. Balance to be stored as adipose tissue.

Measure	Weight Oz.	Protein calories	Total calories
Breakfast:			
Prunes, 4 medium	1.4, dry	3	100
Grapenuts, 3 tbsp	1.0	12	100
Egg, 1	2.4	25	70
Toast, 2 slices	1.0	14	100
Butter, 1 tbsp	0.5	1	100
Cream, thin, ¾ cup	5.4	15	300
Sugar, 1 tbsp. (scant)	0.5	..	50
Coffee, 1 cup	...	..	...
10:30 A. M.:			
Cocoa, ⅘ cup	7.6	32	250
Luncheon:			
Corn chowder, ⅗ cup	4.4	18	150
Fruit salad, 1 serving	3.0	6	200
Roll, 1	1.3	12	100
Butter, 1½ tbsp	0.7	1	150
Chocolate	5.4	18	200
Blanc Mange with 2 tbsp. whipped cream	0.9	2	100
4 P. M.:			
Egg in orange juice, 1 egg, 3 tbsp. juice, 2 tsp. sugar	4.2	25	130

Measure	Weight Oz.	Protein calories	Total calories
Broiled steak, piece 3 in. across	3.0	70	150
Scalloped potatoes, 1 cup (scant)	5.2	13	150
Buttered beets, ⅛ cup	2.0	3	50
Lettuce and tomato salad, 1 serving	5.4	6	200
Salted almonds, 12 nuts	0.5	13	100
Boiled custard, ½ cup	3.3	20	150

The normal weight for a man five feet tall is from 126 to 140 pounds; for a woman it is from 107 to 120 pounds. For a man five feet six inches tall it is from 145 to 154 pounds, and for a woman, from 137 to 147 pounds. A man five feet ten inches should weigh from 168 to 175 pounds, and a woman, from 164 to 170 pounds. By comparing your weight with the average that most nearly corresponds to your height, you can tell whether you are too corpulent or too thin.

Related Subjects. The reader is referred to the following articles in these volumes:

Calorie	Fat
Carbohydrates	Food
Diet	Health Habits
Digestion	Proteins

OBOE, *o'bo,* a wood-wind musical instrument much used in modern orchestras to produce plaintive and wailing effects. Its note is mild, but penetrating, and can be greatly swelled or decreased, giving a wide variety of expression. The oboe is made in three pieces, usually of boxwood, ebony or rosewood, and consists of a tube about twenty-one inches long, tapering from a narrow mouthpiece at one end to a bell-shaped opening at the other. A smaller brass tube containing a reed extends through the instrument, and in its upper and middle sections are holes which the performer opens or stops with his fingers. The oboe has a range of nearly three octaves. In its simplest form it was known to the ancients and may be seen in Egyptian and Grecian sculpture. The name *oboe* is from the Italian. The instrument is sometimes called *hautboy,* from two French words—*haut,* meaning *high,* and *bois,* meaning *wood*—and refers to the high notes produced by the instrument.

THE OBOE

OBSERVATORY, *ob zer'va to ri,* an institution or building supplied with instruments used in observing and studying meteorological and astronomical phenomena. Observation and study of astronomical phenomena are as old as human history, but the first observatory built for the purpose was that erected in Nuremberg by Bernard Walther in 1472.

A modern observatory is equipped with a telescope fitted with a spectroscope and photograph apparatus, transit instruments, meridian circles, sidereal and common clocks and chronometers, magnetic apparatus and instruments for making charts. The telescope is sheltered by a dome, which can be revolved so that its opening may point to any part of the heavens. The foundation upon which the telescope rests is deep and solid, since the least tremor seriously interferes with the observer's work.

Among modern observatories, the Greenwich Observatory in England, founded by Charles II, holds the most important position. It is equipped with the latest and most reliable scientific instruments. Throughout England and the northern part of Europe time is regulated by signal from Greenwich Observatory. In the United States the Naval Observatory at Washington performs the same function. In the United States great scientific progress has been made within recent years, and the observatories are well equipped and under the direction of scientists of high standing. The Harvard University Observatory, the United States Naval Observatory at Washington, the Lick Observatory of the University of California and the Yerkes Observatory belonging to the University of Chicago and situated at Lake Geneva, Wis., are among the most important of the world's observatories. The Canadian Dominion Observatory is at Ottawa.

Related Subjects. The reader is referred to the following articles in these volumes:

Astronomy	Time
Lick Observatory	Weather Bureau
Telescope	Yerkes Observatory

OBSID'IAN, natural glass thrown out in heated condition by volcanoes, its glassy appearance being caused by sudden cooling. It contains about the same substances that are found in ordinary glass, but is usually black. Sometimes the presence of iron causes it to turn a rusty brown on the surface. Obsidian is very hard and brittle, and cannot be drilled and blasted like other rock. Obsidian Cliff, in Yellowstone National Park, is a mountain of glass, and is the largest mass of obsidian known. The road at the foot of this cliff was constructed by making fires on the rock, then breaking it by dashing cold water on it while it was hot.

OCARINA, *ok a re' na,* the diminutive of an Italian word, *oca,* meaning *goose,* is the name applied to a musical instrument originating in Austria or Switzerland. It was so named from its slight resemblance to the egg of a goose. In its simplest form it is a hollow piece of molded clay, with a mouthpiece on one side and holes for keys. In the improved instrument, several different sizes of which are made, the holes are replaced by a row of keys, and at one end is a piston for modifying the note. The various sizes are needed to give variety of sound, as the compass of the ocarina is small and its tones are monotonous.

OCARINA

OCCULT, *ok' ult,* a term referring to the types of learning that sought a knowledge of the hidden or supernatural world. The study aimed to confer a knowledge of mysteries and the control of forces transcending those of common observation. The pursuit of the occult is supported by the idea that the secrets of nature must be guessed, like a riddle; and in practice led to the formation of a cult of those especially fitted to attain the stages of revelation. This in turn is an outgrowth of the belief in the possession of peculiar powers by favored individuals.

The pursuit of the occult sciences changes under different influences. It carries the general tradition of the Orient—Babylonia, Egypt and India—and of stages of adeptship and insight gained by rising above the limitations of the human senses. With this is combined the reading of signs and the control of fate, of which *astrology* is the best type. A similar pursuit among the processes which we should now call physical and chemical led to the development of *alchemy,* in which in turn the central object was the transmutation of metals, particularly of the base metals, into gold. The alchemistic, the astrological and the general "spiritual" pursuits with the underlying idea of penetrating the secrets of hidden forces, possibly by the aid of spirits, developed together, formed a mystic and secret tradition of occult learning. Such learning was handed on by tradition and by the initiation of disciples into the mysteries; the body of doctrine thus accumulated bears the name of *caballah,* or oral secret tradition, which is more particularly applied to the Jewish lore as promulgated in its later form.

It must not be supposed that these several traditions were continuous, or that any one set of doctrines formed the basis of occult learning. Its history is most irregular and represents little more than a series of stages or bypaths of a type of learning that has always had a fascination for certain types of mind. Revivals and survivals of such cults are recorded down to the present time. An interesting one is "Theosophy," as practised by Madame Blavatsky (which see). She revived the idea of a special exclusive lore, distinguishing higher planes of existence and stages of adeptship to comprehend their meaning. The practical demonstration was in the nature of miracles defying the laws of nature, such as the instant transfer of a message from distant places, answers to sealed questions placed in the shrine, etc. These were proven to be accomplished by fraud.

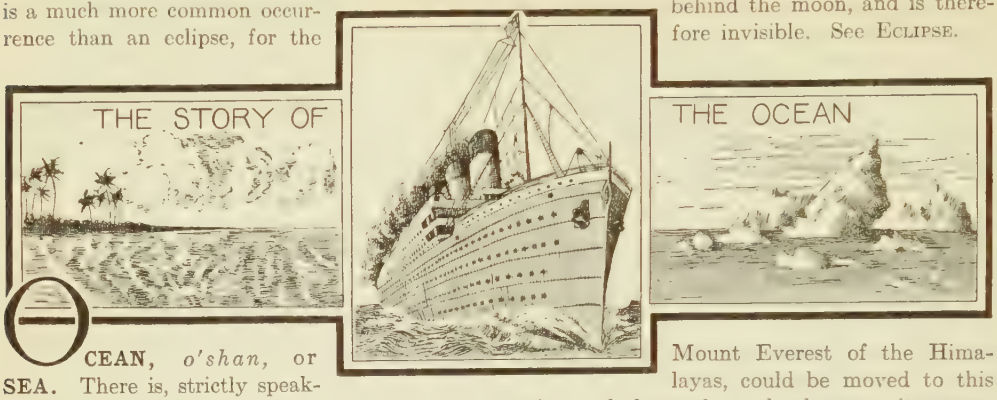
The occult type of thought is consistent with the medieval practices of alchemy and kindred pursuits and with the view of spirit-forces and the nature of the universe supported by medieval philosophy; the effect of Oriental mysticism also pervades it. An interesting incident in the history of the occult sciences is the invention of a mythical sect, the "Rosicrucians," by an anonymous author (1614) inviting members to join a society and learn the making of gold and other secrets. It contained so faithful an interpretation of the occult teachings that it has found its way into surviving forms of the lore. The tendency to turn to abstruse, mystic and exclusive interpretations of the realm of nature is itself an interesting habit of mind and is responsible for the continuance of occult tendencies. J.J.

Relating to Various Beliefs. The articles on the following topics, while they do not all treat of phases of the occult, are of interest in this connection because they deal with pseudo-sciences:

Alchemy	Palmistry
Astrology	Phrenology
Clairvoyance	Physiognomy
Conjuring	Psychical Research
Demonology	Psycho-Analysis
Divination	Spiritualism
Faith Cure	Subconscious
Hypnotism	Suggestion
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft

OCCULTATION, *ok ult a' shun.* When the sun or moon is hidden, wholly or partially, by some planet, the phenomenon is called an

eclipse, but when the same thing happens to a star or a planet it is known as *occultation,* which means, literally, *hiding,* or *concealing.* It is a much more common occurrence than an eclipse, for the moon in its revolution is constantly passing between the earth and some star. In non-technical terms, at such times a star disappears behind the moon, and is therefore invisible. See ECLIPSE.



OCEAN, *o'shan,* or **SEA.** There is, strictly speaking, only one ocean, covering with its salty waters nearly three-fourths of the globe. However, the continents which, like immense islands, lift themselves above "Old Ocean's gray and melancholy waste," divide it roughly into five parts: the stormy Atlantic, commercially the most important; the great Pacific, deepest and largest, taking more than a fourth of the earth's area for its bed; the Indian, with its gentle calms and fierce, sudden hurricanes; and the two polar seas, the Arctic and Antarctic, whose icy waters have not yet been fully explored, so difficult are they to distinguish from the frozen mainland.

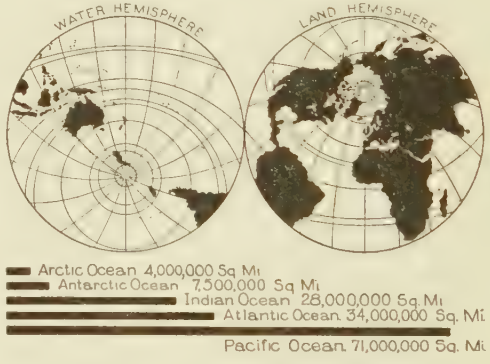
It is impossible to fix the precise boundaries of the different oceans, for the three greatest—the Pacific, Atlantic and Indian—merge their waters in the Antarctic, and the first two meet again in the Arctic. Divisions are largely artificial, for, as the poet Barry Cornwall says, in his *Song of the Sea:*

> Without a mark, without a bound,
> It runneth the earth's wide regions round.

The land masses are so closely grouped that it is possible to speak of a *land hemisphere* and a *water hemisphere,* as shown in the chart, with New Zealand the approximate center of the water hemisphere, as London is of the other.

The Depth of the Sea. The bed of the ocean is many thousands of feet below the glittering surface waters. More than two miles—11,500 feet—is the average depth, which is five times the average elevation of the land. The greatest depth thus far discovered is over six miles—32,088 feet—a sounding made in the Pacific off the island of Mindanao, one of the Philippine group. If the highest mountain on earth, Mount Everest of the Himalayas, could be moved to this point and dropped to the bottom, its snow-capped summit would be 3,000 feet below the waves.

The Bed of the Ocean. The ocean's floor has its depressions and elevations, but on the whole is far smoother than the surface of the land. This is because it is protected by the great body of water above it and is not subject to the action of the forces of erosion, such as wind and water, which carve and cut away the land. In the deep sea everything is calm and quiet, however stormy the water may be on the surface.



WATER AND LAND HEMISPHERES
Showing, also, the areas of the five oceans.

In most parts of the ocean the floor is covered with the chalky fossils of millions and millions of tiny creatures called *foraminifera;* and our chalk cliffs and chalk beds are old ocean bottoms which received these deposits through countless centuries, and then, by the forces which move the earth's crust, were slowly raised out of the water, while some corresponding part of the land sank and became ocean

bed. In the beginning of things the entire earth may have been covered by the sea, for in New England and Alabama and hundreds of other inland regions geologists find shell fossils embedded in the rock, bearing silent witness to their ocean birth. The sea, however, takes daily tribute from the land in the form of sand, gravel and mud brought to it by the rivers. The coarser sand and gravel, being heavy, are deposited fairly close to shore, while the finer sand and mud are washed far out. These *continental deposits,* as they are called, form the *continental shelf,* and beyond it the *continental slope,* and are carefully indicated on navigators' charts so that wrecks may be avoided.

Plant and Animal Life. Sunlight cannot penetrate the water for more than a quarter of a mile, approximately, and therefore in deepest ocean there is no plant life. Where the depth is not beyond the limits to which light can travel, however, there is great richness and variety of verdure—pastures of moss, forests of tangled seaweed, gardens and ferneries of other strange and interesting marine plants, as luxuriant as any on earth and far more fascinating.

There is no need for sight where it is absolutely dark, and therefore the fish living in the very deepest parts of the ocean have no eyes. At lesser depths, however, there are vividly-colored phosphorescent fish which shed a radiance like that of the glowworm and constitute a "street-lighting department" that gives its service free to the fish public of their submarine community. Since there is no vegetation to feed them, the fish of the deep sea exist by preying upon one another, and many tragedies of nature are staged in these dark waters.

The greater the depth, the heavier the pressure of the water, the pressure increasing at the rate of a ton to the square inch for every thousand fathoms (6,000 feet) of depth. This means that fish living on the bottom of the ocean near the island of Mindanao are supporting a weight of nearly six tons upon every square inch of their bodies. Fish adapted to withstand a certain pressure cannot live where the pressure is either greater or less. If they should attempt to swim deeper they would be crushed by the weight of the water, and when they approach too near the surface they burst.

Why There Is Icy Water at the Equator. The surface water of the ocean varies in temperature with the latitude, so we find the hottest water (about 80°) at the equator, and the coldest at the poles. At a depth of several hundred feet, however, the ocean, even in the tropics, becomes extremely cold. This icy water has drifted down from the poles, spreading its chilling effect over the entire sea. In the lowest depths the temperature is very close to freezing point; but there is no danger that the ocean will ever freeze because the water is in perpetual motion through waves, tides and currents, and also because the warm water at the equator, constantly rising to the top, keeps the general temperature from dropping too low.

The Origin of the Ocean's Salt. The old idea has been that the salt in the sea was not there originally but was brought to it little by little, throughout the ages, by the rivers which washed it out of the land. In the process of evaporation the moisture was drawn up, leaving the salt behind and thus gradually concentrating it in the ocean. The best-supported modern theory, however, is that the ocean has been salt from the very beginning of time. The proof offered is the great similarity between the salts found in the ocean and those present in the gaseous matter ejected from the interior of the earth during a volcanic eruption, and the great difference between the salt of ocean water and that of inland salt lakes formed by the evaporation of river water. L.M.B.

Ocean Currents

Strange as it may seem, there are great streams flowing through the ocean and some of them are almost as distinctly divided from the surrounding waters as are the rivers from the land. These currents constitute a regular system of circulation in each ocean; the Atlantic and Pacific each have two systems, one northern and the other southern. According to temperature, ocean currents are classified as *warm* and *cold;* according to position they are *surface currents* or *deep-sea currents. Drift* is a general movement of water on the surface, and it has no distinct bounding lines. A current whose waters are distinctly separated from surrounding waters is called a *stream.*

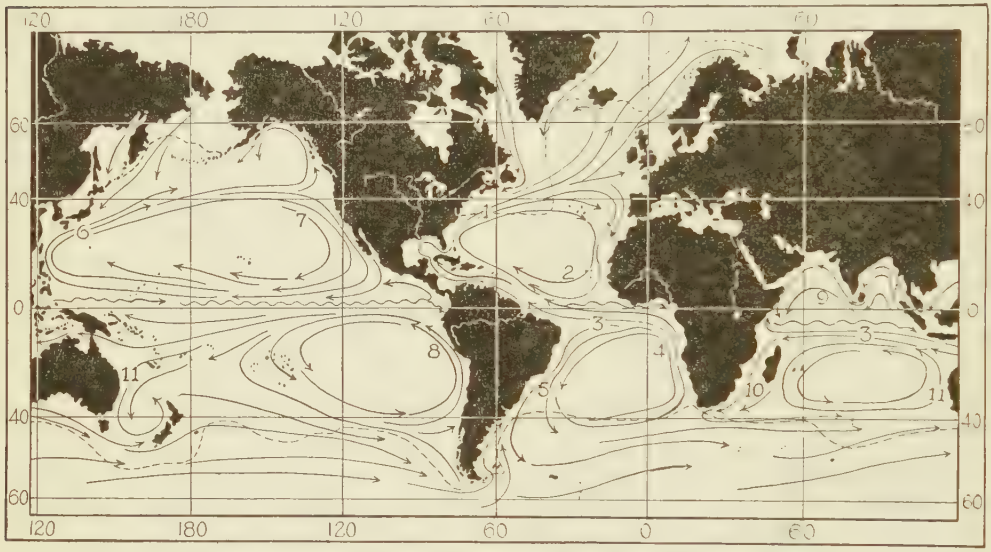
Cause and Movements of Currents. The chief cause of ocean currents is the sun, which warms the water at the surface and also hastens evaporation; the latter increases in rapidity as the equatorial regions are approached. Other causes are tides, irregularities of the coast line, winds and the rotation of the earth. As water cools

it contracts and becomes heavier until it reaches the temperature 39° F. Sea water freezes at 28° F. A large number of records of the temperature of the ocean at different depths proves conclusively that the influence of the sun's rays does not extend much below 1,000 feet; at greater depth the temperature is practically uniform. In the general system of ocean currents the warm water on the surface moves from the equatorial towards the polar regions, where it is cooled to the freezing point. This cold water then settles towards the bottom and moves again towards the equator. Hence in every ocean, except possibly the Indian, there is a deep-sea, cold current moving slowly towards the equator, and warm surface currents moving towards the poles.

Were it not for the rotation of the earth, these currents would move directly north and south. At the equator the rate of rotation is a little over 1,000 miles an hour; at the poles it is nothing. Currents flowing towards the poles are flowing into regions whose velocity of rotation is less than that of the regions they have left, consequently their velocity eastward is greater than that of the surrounding water, and they flow towards the northeast, as in the case of the *Gulf Stream.* Winds also exert a strong influence upon these surface currents, and in all the oceans their direction is approximately the same as that of the prevailing winds.

Currents flowing towards the equator are flowing into regions whose eastward velocity is greater than that of the regions they leave, and they are crowded against the eastern coasts of the continents, like the *Labrador Current.* Moreover, since these are deep-sea currents, their direction in certain localities may be slightly changed by the shape of the ocean bed. The influence of tides and coast line is local and needs no consideration here.

As the surface currents approach the polar regions they are cooled, and the water finally settles to the bottom and begins to journey towards the equator. As it approaches the tropics it becomes warm and rises to the surface to replace that evaporated by the great heat of the sun in these regions.



PRINCIPAL OCEAN CURRENTS OF THE WORLD

(1) Gulf Stream; (2) Canary Current; (3) Equatorial Current; (4) Benguela Current; (5) Brazilian Current; (6) Japan Stream; (7) California Current; (8) Peruvian Current; (9) Monsoon Current; (10) Mozambique Current; (11) Australian Current.

Currents of the North Atlantic. North of the equator the trade winds (which see) drive a current westward, forming the *North Equatorial Current;* when this current reaches the West Indies it divides, a part of it entering the Caribbean Sea and the other part bending northward and joining the Gulf Stream, which issues from the Gulf of Mexico and follows the coast northward to Cape Hatteras, when it turns eastward and spreads out until it becomes a fan-shaped drift carrying warm water and winds to the coast of Europe and greatly moderating the climate of the northern part of that continent. One branch passes along the coast

of Norway into the Arctic Ocean and the other turns southward and joins the North Equatorial Current. Within this system of currents is a body of water with no currents. Here seaweed collects in large quantities, forming what is known as the *Sargasso Sea*. The currents of the North Atlantic flow along the coast in the direction of the hands of a clock. The Labrador Current from Arctic regions comes to the surface at about the latitude of Newfoundland, and is one of the chief causes of the cold climate of that region.

Currents of the South Atlantic. The system in the South Atlantic is similar to that already described, except that the open ocean at the south makes the south current corresponding to the Gulf Stream less distinct. The *South Equatorial Current* is supplied from the cool *Benguela Current,* off the west coast of Africa. A part of the South Equatorial Current turns northward off the coast of Brazil and joins the North Equatorial Current. In the South Atlantic the currents move in a direction contrary to that of the hands of a clock.

Currents of the Pacific. The currents in the North Pacific are similar to those in the North Atlantic, only they are less definitely marked, owing to the greater size of the ocean. Here the *Kuro-Siwo,* or *Japan Current,* corresponds to the Gulf Stream and produces a warming effect upon the climate of the west coast of North America similar to that produced by the Gulf Stream upon Europe. Roses bloom in January in gardens in Washington and Oregon, and Sitka is seldom as cold as the average Chicago winter.

In the South Pacific the currents are not definitely marked, owing to the great expanse of water, but the system of circulation is similar to that of the other oceans.

Currents of the Indian Ocean. The system in the Indian Ocean is similar to that of the South Pacific. There is a current of cold water along the west coast of Australia that is noticeable along the east coast of South Africa. The South Equatorial Current turns southward off the coast of Madagascar, and a current of warm water flows through the Mozambique Channel. The northeast monsoon may reverse the currents in the North Indian Ocean, otherwise they are similar to those in the North Atlantic. Currents in the great polar seas at the South are mainly drifts.

The extent and direction of the various currents are plainly shown in the accompanying chart. W.F.R.

Ocean Routes

To a landsman journeying on the broad surface of the open sea, where, as Schiller says, there is

> Nothing before and nothing behind but the sky and the ocean,

the vast expanse of waters may indeed seem a trackless wilderness. Yet there are roads on the sea—ocean lanes, they are called—just as definitely fixed as those on land. In one of the main-traveled lanes no steamer is ever very far from another, as the map on page 4336 shows, but away from the regular track one might drift for years without being seen.

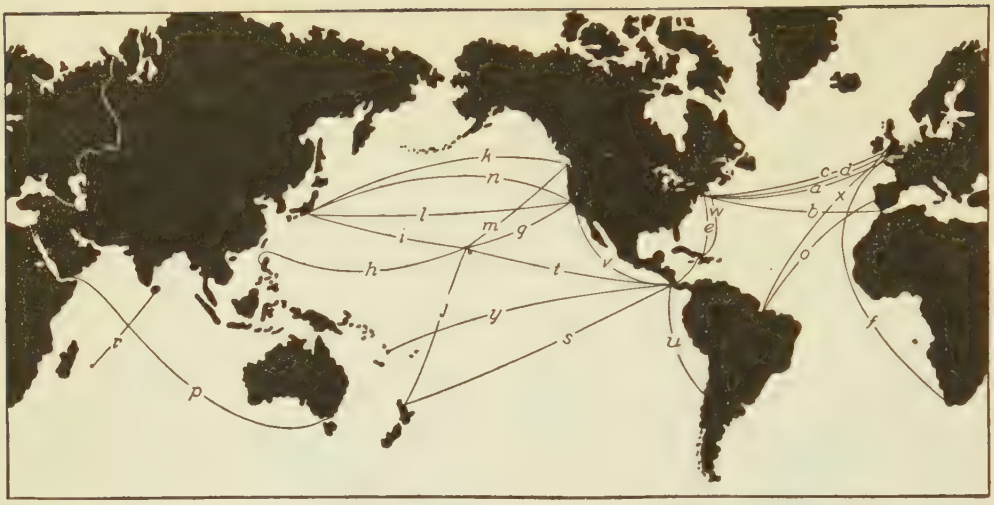
If you were given charge of a ship just outside of New York harbor and told to sail it to the Portuguese coast you would probably steer so as to pass through all points in a line directly east. But a sea captain starting at the same time and steaming at the same speed would get there before you, for he would know a shorter route. If, however, you were instructed to make for a point in the Bahamas directly south of New York, your rival could not pass you, for the compass route is the shortest. The reason for this difference is that, as we are taught in geometry (see SPHERE), the shortest line between two points on the surface of a globe is part of a *great circle* (that is, a circle whose center is the center of the globe), and our lines of longitude are great circles, but our lines of latitude are not. A great circle line between New York and Portugal would run a little toward the north of east until the middle of the trip and then turn a little southward.

Ocean routes do not always follow the great circle exactly. Sometimes the way is blocked by islands or, as in the North Atlantic, there is danger from icebergs or fog. Usually eastbound boats follow a different lane from that followed by those westbound. C.H.H.

Consult Giberne's *The Mighty Deep and What We Know about It;* Ingersoll's *The Book of the Ocean;* Murray's *The Ocean.*

Related Subjects. The reader is referred to the following articles in these volumes. The list of seas, gulfs and bays under GEOGRAPHY may also be consulted.

Antarctic Lands and Seas
Arctic Lands and Seas
Atlantic Ocean



PRINCIPAL ROUTES BY SEA

(*a*) New York to Hamburg, 3,395 mi.
(*b*) New York to Gibraltar, 3,204 mi.
(*c*) New York to Liverpool, 3,079 mi.
(*d*) New York to Southampton, 3,080 mi.
(*e*) New York to Panama, 1,920 mi.
(*f*) Cape Town to Plymouth, 5,948 mi.
(*g*) San Francisco to Honolulu, 2,089 mi.
(*h*) Honolulu to Manila, 4,645 mi.
(*i*) Honolulu to Yokohama, 3,445 mi.
(*j*) Honolulu to Auckland, 3,850 mi.
(*k*) Vancouver to Yokohama, 4,230 mi.
(*l*) San Francisco to Yokohama, 4,791 mi.
(*m*) Vancouver to Honolulu, 2,410 mi.
(*n*) Yokohama to San Francisco, 4,536 mi.
(*o*) Para to Lisbon, 3,248 mi.
(*p*) Aden to Melbourne, 6,310 mi.
(*r*) Mauritius to Colombo, 2,090 mi.
(*s*) Panama to Auckland, 4,180 mi.
(*t*) Honolulu to Panama, 4,723 mi.
(*u*) Panama to Valparaiso, 2,712 mi.
(*v*) Los Angeles to Panama, 2,870 mi.
(*w*) Boston to Colon, 2,092 mi.
(*x*) Liverpool to Para, 4,010 mi.
(*y*) Apia to Panama, 5,739 mi.

Gulf Stream
Indian Ocean
Japan Current
Labrador Current
Pacific Ocean
Sargasso Sea

OCEANIA, *o she an' i a,* a name used by geographers to designate that portion of the globe which includes most of the islands of the South Pacific Ocean. Authorities differ somewhat as to the exact limits of the groups, but according to a method of classification adopted by many geographers Oceania is made up of four divisions. These are *Australasia,* including Australia, Tasmania and New Zealand, with adjacent islands; *Melanesia,* including the Bismarck, Solomon and several other archipelagoes east of Australia; *Micronesia,* a group lying chiefly north of the equator between the Philippines (on the west) and the 180th meridian; and *Polynesia,* a large group lying east of the 180th meridian. (The exact location of these divisions is shown on the accompanying map. Note also names of islands and other information.) The most important islands are described in these volumes under their respective titles, and are listed at the end of the article ISLAND.

OCEANOGRAPHY, *o shan og' ra fi,* that department of geography which embraces a study of the oceans. It deals with tides and currents, composition, color and density of sea water, marine life, distribution and depth of ocean waters, effect on climate and kindred topics. The term has been in use a much shorter period than the general term *geography,* chiefly because man's knowledge of the great water areas of the earth was comparatively limited until the latter part of the nineteenth century. See list of related topics at the end of the article OCEAN.

OCELOT, *o' se lot,* a medium-sized animal of the cat family, known as the *leopard cat* of

THE OCELOT
One of the handsomest members of the cat family.

America. It is one of the most beautiful of the four-footed animals, and ranges from Southern Texas into South America. The ocelot lives

OCEANIA AND MALAYSIA

POLITICAL DIVISIONS OF OCEANIA AND MALAYSIA

British Possessions	Area Sq. M.	Population Colored †	Population White	Government
Commonwealth of Australia and Dependencies	2,974,581		4,455,005	Self-governing colony
Dominion of New Zealand and Dependencies	103,581	49,844	1,008,468	Self-governing colony
British Solomon Islands	14,800	150,000	600	Protectorate with Resident Commissioner
Santa Cruz Islands	388	8,000		Under Solomon Islands Protectorate
Fiji with Rotumah	7,435	135,834	3,707	Crown Colony
Gilbert Islands	166	26,417	446	Protectorate under High Commissioner
Ellice Islands	14	3,084	7	Protectorate under High Commissioner
Phœnix Islands	16	60		Protectorate under High Commissioner
Tokelau Islands (Union Is.)	7	1,000		Protectorate under High Commissioner
Tonga or Friendly Islands	390	23,357	380	Native Kingdom under British protection
Fanning, and scattered islets	280	359		
British North Borneo	31,106	207,828	355	Administered by Br. N. Borneo Company
Brunei (N. W. Borneo)	4,000	30,000		Protectorate
Sarawak	42,000	500,000		Under British Protection
British New Guinea	90,540	250,393	1,186	Territory of the Commonwealth of Australia
Total British	3,269,304	1,386,167	5,470,154	
French Possessions				
New Caledonia and Dependencies	8,548	52,208	20,000	Colony administered by a resident Governor
New Hebrides	5,100	70,000	600	Joint Anglo-French protectorate
Marquesas Islands	480	3,424		French Colony, with Governor resident at Papute, Society Islands
Society Islands	650	20,000		
Tuamotu Islands	360	3,828		
Tubuai Islands	115	2,550		
Total French	15,253	152,010	20,600	
United States Possessions				
Guam (in Mariana or Ladrone Is.)	210	12,240		U. S. Naval Station
Samoan Islands:				
Tutuila Island	77	7,250		U. S. Naval Station under a commandant
All other islands east of 171° W	25	1,800		
Hawaiian (Sandwich) Islands	6,740	232,856		A Territory of the United States
Midway, Wake, Marcus, and other scattered islets	20			
Philippine Islands	115,026	8,937,600		Protectorate with native participation
Total, United States	122,098	9,191,746		
Former German Possessions				
Kaiser Wilhelm's Land	70,120	531,000	283	Mandatory of Australia
Bismarck Archipelago	18,200	188,396	685	Mandatory of Australia
Solomon Islands	4,200	45,000		
Mariana Islands (except Guam)	250	2,646		Mandatory of Japan
Caroline and Pelew Islands	560	40,000		Mandatory of Japan
Marshall Islands	150	15,000	179	Mandatory of Japan
Samoa Islands	1,000	35,000	600	Mandatory of New Zealand
Total	94,480	857,042	1,747	
Netherlands Possessions				
Molucca Islands	43,864		321,000	The Dutch possessions are administered by a Governor-General, who is assisted by a legislative and advisory Council. The natives share in the government
New Guinea, East of 141° E	151,789		240,000	
Sunda Islands	541,162		47,439,000	
Total Netherlands	736,815		48,000,000	
Japanese Possessions				
Bonin and Volcano Islands	35	5,000		
Chilian Possessions				
Easter Island and Sala y Gomez	47	150		
Portugese Malaysia				
Timor Island, eastern portion				Portuguese Colony, independent district
Pulo Cambing, islet				

† Includes natives and colored immigrants.

RACES

I. Negroid Peoples:
- A. Papuasians—
  1. *Papuans* proper: N. W. Part of New Guinea, and E. Malaysia
  2. *Melanesians* (Papuan stock): Bismarck Archipelago, Louisiade Islands, Solomon Islands, Santa Cruz Islands, New Caledonia, New Hebrides, Loyalty Islands, Fiji
- B. Australians—
  1. *Australians* proper: Australia (where not settled)
  2. *Tasmanians* (Papuan type) Tasmania (extinct since 1876)

II. Mongol-Caucasic Peoples:
Malaysians: Islands of the East Indian Archipelago

III. Caucasic Peoples:
- A. Polynesians—
  1. *Maoris:* New Zealand
  2. *Tongans:* Tonga Islands
  3. *Tahilians:* Society Islands
  4. *Marquesans:* Marquesas Islands
  5. *Samoans:* Samoa
  6. *Hawaiians:* Hawaii
  7. Polynesians of other Islands
- B. European Immigrants—
  Chiefly *English, Dutch, German, Irish, Scotch, Welsh*

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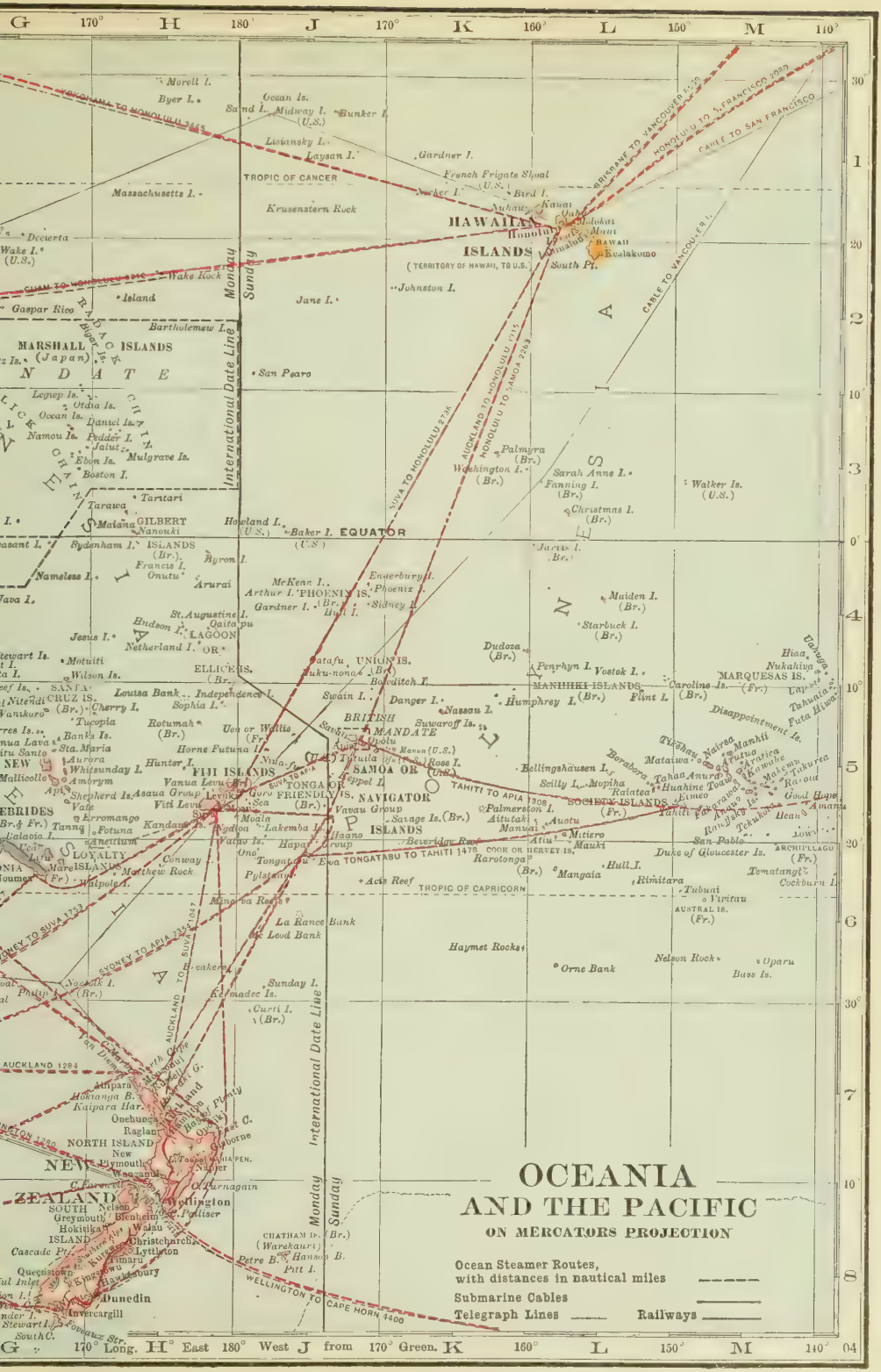

OCEANIA
AND THE PACIFIC
ON MERCATORS PROJECTION
Ocean Steamer Routes, with distances in nautical miles
Submarine Cables
Telegraph Lines
Railways
International Date Line
Monday
Sunday
HAWAIIAN ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
ELLICE IS.
FIJI ISLANDS
TONGA OR FRIENDLY IS.
SAMOA OR NAVIGATOR ISLANDS
SOCIETY ISLANDS
MARQUESAS IS.
NEW ZEALAND
NORTH ISLAND
SOUTH ISLAND
TROPIC OF CANCER
TROPIC OF CAPRICORN
EQUATOR
Long. H° East 180° West J from 170° Green. K 160° L 150° M 140°

OCEANIA AND MALAYSIA

NATURAL DIVISIONS: OCEANIA, MALAYSIA

I. Oceania, Principal Members

A. *Australasia:*
1. Australia and adjacent islands
2. Tasmania and adjacent islands
3. New Zealand and adjacent islands

B. *Melanesia:*
1. Admiralty Islands
2. Bismarck Archipelago
3. Fiji Islands, with Rotumah
4. Louisiade Islands
5. Loyalty Islands
6. New Caledonia
7. New Hebrides Islands, with Torres and Banks Groups
8. Santa Cruz (Queen Charlotte) Islands, with Swallow, Duff or Wilson, and Tucopia Groups
9. Solomon Islands
10. Numerous intervening small groups, islets, and rocks

C. *Micronesia:*
1. Caroline Islands
2. Gilbert Islands
3. Mariana (Ladrone) Islands
4. Marshall Islands
5. Pelew Islands

D. *Polynesia:*
1. Cook Islands
2. Ellice Islands
3. Hawaiian (Sandwich) Islands
4. Manihiki (Penrhyn) Islands
5. Marquesas Islands
6. Phœnix Islands
7. Samoan (Navigator) Islands
8. Society Islands
9. Tonga (Friendly) Islands
10. Tubuai Islands
11. Tuamotu Islands
12. Union Islands, and many lesser Islands

II. Malaysia or East Indian (Malay) Archipelago

1. Sunda Islands:
   Great Sunda Islands
   Little Sunda Islands
2. Molucca (Spice) Islands
3. New Guinea
4. Philippine Islands

PRINCIPAL ISLANDS

Islands	Area Sq. M.	Chief Products
Admiralty Is., B. A.	755	Copra, coffee, cotton
Auckland Is., N. Z.	350	
Bali I., L. S.	4,065	Coffee, rice, tobacco
Banka I., G. S.	4,446	Cocoanuts, spices, tin
Billiton I., G. S.	1,863	Trepang, tin, tortoise shell
Bismarck Archipelago	18,200	Copra, cotton, coffee, rubber
Borneo I., G. S.	293,496	Fruits, gums, timbers
Bougainville I., S. Is.	3,860	Sandal-wood, tortoise-shell
Buru I., M. Is.	3,250	Sago, dye-woods, teak
Buton I., G. S.	1,700	Rice, maize, tropical fruits
Caroline Islands	388	Copra
Celebes I., G. S.	72,070	Woods, coffee, indigo, tobacco
Ceram (Serang) I., M. Is.	6,800	Rice, tobacco, coffee
Chatham Islands	375	Wool, hides
Choiseul I., S. Is.	1,200	Copra, green snail and trochus shell
Cook Islands, N. Z.	150	Copra, coffee, pearl shell
Easter (Rapanui) I.	47	
Ellice Islands	14	Copra, phosphates
Fiji Islands	7,421	Sugar, copra, tea, fruits
Flores I., L. S.	5,860	Sandal wood, bees-wax, woods
Gilbert Islands	166	Copra, phosphates
Guadalcanar I., S. Is.	1,600	Copra, shells
Guam I., L.	210	Tropical fruits, rice, sugar
Halmahera (Gilolo) I., M. Is.	6,900	Sago, spices, fruits, pearls
Hawaii I., H. Is.	4,210	Sugar, coffee, fruit
Hawaiian (Sandwich) Is.	6,740	Sugar, coffee, fruits
Jaluit I., M. G.		Phosphates
Java I., G. S.	50,557	Coffee, copra, spices, tobacco
Kahoolawe I., H. Is.	63	
Kauai I., H. Is.		Coffee, rice, sugar
Kei (Key) Islands, L. S.		Timber
Kermadec Islands, N. Z.	15	
Lanai I., H. Is.	150	
Lombok I., L. S.	2,000	Cattle, buffaloes, horses
Loyalty Islands	800	Copra, rubber, bananas
Luzon I., P. Is.	40,969	Rice, sugar, hemp, coffee
Madura I., G. S.	1,709	Coffee, copra, tobacco
Malayta I., B. S.	2,395	Copra, shells
Malden Island	35	Guano
Manihiki (Penrhyn) Is.	53	Copra, shells
Mariana (Ladrone) Is.	410	Rice, tropical fruits
Marquesas Islands	480	Copra, fruits, mother of pearl
Marshall Islands	155	Copra, phosphates
Maui I., H. S.	760	Coffee, sugar
Midway Is., H. Is.	20	
Mindanao I., P. Is.	36,292	Rice, sugar, coffee, tobacco
Mindoro I., P. Is.	3,851	Woods
Molokai I., H. Is.	270	Fruits
Molucca Islands	43,864	Spices, sago, rice, indigo
Morotai I., M. Is.	970	Sago, indigo, rice
Negros I., P. Is.	4,881	Tobacco, coffee, sugar
New Caledonia Island	7,650	Maize, coffee, vanilla, copra
New Guinea Island	284,768	Rice, sugar, maize, fruits
New Hanover I., B. A.	600	Copra, rubber, coffee
New Hebrides Islands	5,100	Copra, maize, coffee, woods
New Lauenburg Is., B. A.	27	Copra, rubber, coffee
New Mecklenburg I., B. A.	4,920	Copra, rubber, coffee
New Pomerania I., B. A.	9,500	Copra, rubber, coffee
Niihau I., H. Is.	97	Yams, sweet potatoes
Norfolk Islands	15	Fruits
Oahu I., H. Is.	600	Cotton, indigo, coffee
Palawan I., H. Is.	4,027	Coffee, sugar cane, cacao
Panay I., P. Is.	4,611	Rice, cotton, sugar cane
Paumotu (Tuamotu) Is.	360	Pearl shells, cocoanuts
Pelew Islands	172	
Philippine Islands	115,026	Coffee, sugar, hemp
Phœnix Islands	16	Guano
Ponapé I., C. Is.	134	Copra
Riau-Lingga Arch.	16,301	
Rotumah I., Fiji	14	Copra
Samar I., P. Is.	5,031	Hemp, sugar, rice, coffee
Samoa (Navigator) Is.	1,100	Copra, tropical fruits
Savaii I., Sa. Is.	660	Copra, tropical fruits
Society Islands	650	Cotton, copra, cocoanuts
Solomon Islands	14,809	Copra, shells
Sumatra I., G. S.	159,739	Black pepper, tobacco
Sumba I., L. S.	4,300	Timber, horses
Sumbawa I., L. S.	5,200	Sandal wood, rice, tobacco
Tahiti I., S. G.	600	Copra, sugar, rum
Timor I., L. S.	17,698	Bamboo, maize, tobacco
Timor Laut Is., L. S.	2,060	Cattle, trepang
Tonga (Friendly) Is.	390	Copra, bananas, oranges
Tubuai Islands	115	Copra, shells
Tutuila Is., Sa. Is.	77	Copra, coffee
Union (Fokelau) Islands		Copra
Upolu I., Sa. Is.	340	Copra, coffee, cacao
Vanua Levu I., Fiji	2,600	Sugar, copra, fruits
Viti Levu I., Fiji	4,250	Sugar, copra, fruits
Waigeu I., M. Is.	780	Timber, spices
Wallace Archipelago	40	Shells, copra

Abbreviations: I., Island; Is., Islands; B. A., Bismarck Archipelago; C. Is., Caroline Islands; G. S., Great Sunda Is.; H. Is., Hawaiian Islands; L., Ladrone or Mariana Is.; L. S., Little Sunda Is.; M. G., Marshall Group; M. Is., Molucca Is.; N. Z., New Zealand; P. Is., Philippine Is.; Sa. Is., Samoan Is.; S. Is., Solomon Is.; S. G., Society Group.

entirely in forest trees and is an agile climber; its principal food is mice, birds and monkeys. If taken young it can be tamed and almost domesticated, and is often kept as a pet by the forest Indians of South America. The ground-tint of the fur is smoky-pearl in color, and black spots develop from mere dots on the legs and feet to large shell-shaped spots on other parts of the body. The nose is pink, and the eyes are large and translucent. The ornamental coloring is seldom quite the same in any two specimens. Ocelots are killed for their beautiful skin; this is made into fur garments, which are very valuable.

OCHER, or **OCHRE,** *o'ker.* We often read of mineral paint, without thinking about what the term means. There are several minerals which when ground to a fine powder and mixed with linseed oil form paints. Ocher is one of these minerals. It is a combination of iron and lime formed in bogs and marshes by water containing the iron in solution. This substance often mixes with clay and colors it yellow. When dried and ground this clay forms the yellow ocher of commerce, though the clay is not ocher at all. Ochers vary in color from pale yellow to brownish red, and some yellow ochers turn red when heated to a high temperature.

O'CONNELL, *o kon''l,* DÁNIEL (1775-1847), one of the most distinguished of Ireland's patriotic leaders and orators, known as "the Liberator." He was born in County Kerry in 1775, and was educated in Cork and at the Roman Catholic colleges of Saint-Omer and Douai, in France. He was admitted to the Irish bar in 1798, where he rose to an eminent height and became distinguished for his powers of oratory. In 1828 Clare County elected him to Parliament, but the oath required by the Test Acts (which see) prevented him from taking the seat, as he was a Roman Catholic. The next year, after the repeal of the restricting laws, he was reëlected, and remained a member of Parliament until the end of his life. In 1843, following his strenuous activity for the repeal of the Union between Great Britain and Ireland, he was arrested for conspiracy, convicted and sentenced to imprisonment for a year. This judgment, however, was reversed by the House of Lords. O'Connell made his last speech in Parliament in 1847.

O'CONNELL, WILLIAM HENRY (1859-), an American cardinal of the Roman Catholic Church. He was born in Lowell, Mass., and was educated at Boston and at Rome. In 1884 he was ordained a priest, in 1896 he became rector of the American College at Rome, and in 1901 was consecrated bishop of Portland, Me. He was sent, in 1905, as special Papal envoy to the emperor of Japan, who presented him with the Grand Cordon of the Sacred Treasure. Upon his return to America he was named coadjutor archbishop of Boston, and on November 27, 1911, was created cardinal by Pius X. In 1911 a volume of his *Sermons and Addresses* was published. He presides over the archdiocese of Boston.

CARDINAL O'CONNELL

OCTAVE. Stretch a fine wire tightly between two supports, and pluck it with the fingers. It vibrates and gives out a musical sound. Now place a sharp object, as a knife blade, under the exact center of the wire, and with the finger cause one-half to vibrate. The sound which is given out is an *octave* higher that than produced by the longer wire; that is, it is the eighth tone above it in the scale. The two tones resemble each other very closely —in fact, when a tone and its octave are sounded together, it is difficult to distinguish them. All tones which stand in the relation of octaves to each other bear the same name; each *C* in the scale is separated by one or more octaves from each other *C,* and each *do* by an exact number of octaves from each other *do.* This is true of all other letters and tone names.

OCTAVIA, *ok ta'vi a,* a Roman matron, sister of the Emperor Augustus, and the widow of the consul Claudius Marcellus. In 41 B.C. she married Mark Antony to secure his reconciliation with her brother (see ANTONY, MARK). Octavia was noted for womanly virtues as well as beauty, but Antony forsook her for the lure of Cleopatra, the fair queen of Egypt, in whose presence he forgot ambition and country (see CLEOPATRA). After the Battle of Actium, in 31 B.C., Antony divorced Octavia, but her noble character was shown in her devotion to his children, as well as to her own. Her son, Marcus Marcellus, was adopted by the emperor as his heir and became a distinguished Roman general. Octavia died in 11 B.C., and a splendid temple was built in her honor by Augustus.

OCTAVIUS, or **OCTAVIAN'US.** See AUGUSTUS.

OCTOBER CALENDAR

Birthdays

1. James Lawrence, 1781.
3. George Bancroft, 1800.
4. Rutherford B. Hayes, 1822.
5. Jonathan Edwards, 1703.
6. Sir Isaac Brock, 1769.
   Jenny Lind, 1820.
7. John White Alexander, 1856.
8. Edmund Clarence Stedman, 1833.
   John Hay, 1838.
9. Cervantes, 1547.
   Winfield Scott Schley, 1839.
10. Benjamin West, 1738.
12. Jonathan Trumbull, 1710.
    George W. Cable, 1844.
13. Edward Blake, 1833.
14. William Penn, 1644.
15. Vergil, 70 B. C.
16. Noah Webster, 1768.
18. Helen Hunt Jackson, 1831.
19. James Henry Leigh Hunt, 1784.
20. Christopher Wren, 1632.
21. Samuel Taylor Coleridge, 1772.
    Samuel F. Smith, 1808.
    Will Carleton, 1845.
22. Franz Liszt, 1811.
23. Adlai E. Stevenson, 1835.
26. Moltke, Count von, 1800.
27. Theodore Roosevelt, 1858.
28. Desiderius Erasmus, 1466.
29. Thomas F. Bayard, 1828.
30. Gertrude Atherton, 1858.
31. John Keats, 1795.

Events

1. New government buildings at Quebec dynamited, 1885.
2. John André put to death as a spy, 1780.
3. Chinese senate opened, 1910.
4. Battle of Germantown, 1777.
5. Costa Rica discovered by Columbus, 1502.
   Defeat of British at Thames River, Canada, 1813.
   Marquis of Lorne appointed Governor-General of Canada, 1878.
6. Tripoli occupied by Italian marines, 1911.
   Austro-German forces invaded Serbia, 1915.
7. Battle of Lepanto, 1571.
8. Chicago fire broke out, 1871.
   Montenegro declared war on Turkey, 1912.
9. Alaska transferred to United States by Russia, 1867.
   Germans occupied Antwerp, 1914.
10. Battle of Tours, 732.
11. Invasion of Rumania by Germans begun, 1916.
12. Columbus discovered first land in New World, 1492.
    Ghent captured by Germans, 1914.
13. Sir Isaac Brock killed in battle, 1812.
    Belgian government moved to Havre, France, 1914.
14. Czar of Russia and emperor of Japan signed treaty of peace, 1905.
    Allies occupied Ypres, 1914.
15. Czar of Russia prohibited sale of alcohol forever, 1914.
16. Marie Antoinette executed, 1793.
    John Brown made his raid on Harper's Ferry, 1859.
17. Burgoyne surrendered at Saratoga, 1777.
18. Marriage of Ferdinand and Isabella, 1469.
    John Brown captured at Harper's Ferry by Robert E. Lee, 1859.
19. Cornwallis surrendered at Yorktown, 1781.
20. King Otto of Greece abdicated, 1862.
21. First joint Parliament of England and Scotland met, 1707.
    Battle of Trafalgar, 1805.
22. Brazil declared itself independent of Portugal, 1822.
24. Bulgarians occupied Uskub, 1915.
25. Battle of Agincourt, 1415.
    Battle of Balaklava—the "Charge of the Light Brigade," 1854.
26. Sweden recognized independence of Norway, 1905.
27. Balkan allies began siege of Adrianople, 1912.
28. Cuba discovered by Columbus, 1492.
    Statue of Liberty dedicated, 1886.
29. Turkey began war on Russia, 1914.
30. World's Columbian Exposition closed, 1893.
31. Luther's theses nailed to church door at Wittenberg, 1517.
    Nevada admitted to the Union, 1864.

For Study

Whittier's *Corn Song*
Frost
Leaf-Coloring
Song Sparrow
Crow
Aster
Bulbs
Corn
Wordsworth's *Kitten and the Falling Leaves*
Millet, *The Gleaners*
Nuts
Squirrel
Jackson, *October's Bright Blue Weather*
Harvest Moon

OCTOBER QUOTATIONS

1. Season of mists and mellow fruitfulness!
Close bosom-friend of the maturing sun;
Conspiring with him how to load and bless
With fruit the vines that round the thatch-eaves run. —*Keats.*

2. Now Autumn's fire burns slowly along the woods,
And day by day the dead leaves fall and melt,
And night by night the monitory blast
Wails in the key-hole. —*Allingham.*

3. A prince can mak a belted knight,
A marquis, duke, and a' that;
But an honest man's aboon his might,
Guid faith, he maunna fa' that.
—*Burns.*

4. He serves his party best who serves the country best. —*Hayes.*

5. At every turn the maples burn,
The quail is whistling free,
The partridge whirs, and the frosted burs
Are dropping for you and me.
—*Stedman.*

6. Self-trust is the essence of heroism.
—*Emerson.*

7. Heap high the farmer's wintry hoard!
Heap high the golden corn!
No richer gift has Autumn poured
From out her lavish horn.
—*Whittier.*

8. Confidence is that feeling by which the mind embarks in great and honorable courses with a sure hope and trust in itself. —*Cicero.*

9. Tell me thy company, and I will tell thee what thou art. —*Cervantes.*

10. Ere, in the northern gale,
The summer tresses of the trees are gone,
The woods of Autumn, all around our vale,
Have put their glory on.
—*Bryant.*

11. Yellow, mellow, ripened days,
Sheltered in a golden coating;
O'er the dreamy, listless haze,
White and dainty cloudlets floating.
—*Carleton.*

12. To God, thy countrie and thy friend, be true. —*Vaughan.*

13. When woods begin to wear the crimson leaf,
And suns grow meek, and the meek suns grow brief,
And the year smiles as it draws near its death. —*Bryant.*

14. "Honesty is the best policy," but he who acts on that principle is not an honest man. —*Whately.*

15. They are able because they think they are able. —*Vergil.*

16. Sing a song of seasons,
Something bright in all!
Flowers in the summer,
Fires in the fall. —*Stevenson.*

17. An honest man's word is as good as his bond. —*Cervantes.*

18. O suns and skies and clouds of June,
And flowers of June together,
Ye cannot rival for one hour
October's bright blue weather.
—*Jackson.*

19. His store of nuts and acorns now
The squirrel hastes to gain,
And sets his house in order for
The winter's dreary reign. —*Cary.*

20. Sing me a song of the Autumn clear,
With the mellow days and the ruddy eves;
Sing me a song of the ending year,
With the piled up leaves.
—*Duncan Scott.*

21. He prayeth best who loveth best
All things, both great and small;
For the dear God who loveth us,
He made and loveth all.
—*Coleridge.*

22. Bright, pallid, changing, chill October morn:
Across your windy, keen, exhilarant air,
You loom, a cameo dream, a vision fair.
—*Wilfred Campbell.*

23. How happy is he born and taught
That serveth not another's will;
Whose armour is his honest thought,
And simple truth his utmost skill.
—*Wotton.*

24. I love to wander through the woodlands hoary,
In the soft light of an autumnal day,
When Summer gathers up her robes of glory,
And like a dream of beauty glides away. —*Whitman.*

25. An honest man's the noblest work of God. —*Pope.*

26. Autumn
Into earth's lap does throw
Brown apples gay in a game of play,
As the equinoctials blow. —*Mulock.*

27. Never esteem anything as of advantage to thee that shall make thee break thy word or lose thy self-respect.
—*Marcus Aurelius.*

28. Gone are the birds that were our summer guests,
With the last sheaves return the laboring wains. —*Longfellow.*

29. This above all—to thine own self be true,
And it must follow, as the night the day,
Thou canst not then be false to any man. —*Shakespeare.*

30. The brown leaves rustle down the forest glade,
Where naked branches make a fitful shade,
And the lost blooms of Autumn withered lie. —*Arnold.*

31. A thing of beauty is a joy forever;
Its loveliness increases; it will never
Pass into nothingness. —*Keats.*

OCTOBER, *ok to' ber,* the tenth month of the year, and in temperate climates one of the most beautiful of all the months. Its name is from the Latin word for *eight,* for in early Roman times it was the eighth month, and only with the revision of the calendar by Julius Caesar did it receive its present place. More than once the Senate tried to rechristen it, as July was rechristened after Julius and August after Augustus. Thus for a time it was called *Antoninus,* then *Tacitus* and even *Faustinus,* after the wife of an emperor; but none of these names became popular, and the month continued to be miscalled October. From the time of Julius Caesar it has had thirty-one days. Its special gem is the opal or tourmaline; its flower the graceful, decorative hop blossom.

Character of the Month. In the latitude of Canada and the United States, October is usually a delightful month. In the northern part of the region the first frosts are likely to occur during October, but cold weather does not come to stay, and days of hazy sun, followed by crisp, bracing nights, are the rule. The air has a peculiar tang that seems to belong to this month alone, and the person who is compelled to, or privileged to, spend much time out-of-doors is very fortunate.

In country or woodland regions the chief beauties of the month consist in its changing foliage. The woods are gorgeous with crimson, russet and gold, and even the somber pine forests are lighted here and there by the yellow torches of the birch trees. Goldenrod and wild asters still make the roadsides gay, and the fringed gentian rivals in its unassuming beauty the spring flowers.

With the falling of the leaves many of the birds are deprived of their shelter, and the killing frost robs the insect-eating birds of their food. October is a busy time, therefore, for the birds, and by the end of the month few of the insect-eaters are left in the northern latitudes. October might be called the sparrows' month, however, so numerous and so busy are they everywhere. For they are seed-eaters, and the dry fields and meadows furnish them feasts. The farmer should do his best to attract these birds, for the millions of weed seeds they devour might, if allowed to fall to the ground and grow, do untold harm to his next year's crops.

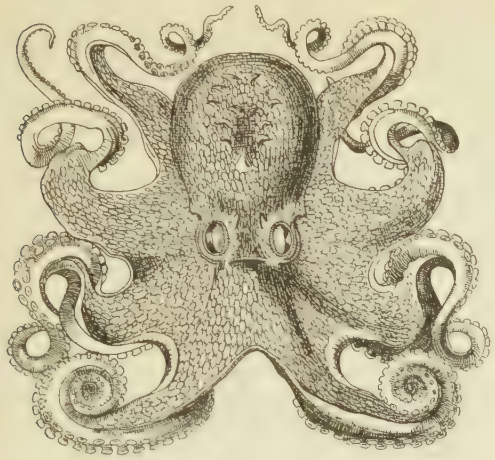
Special Days. October 12 has a very special interest to dwellers in America, for on that day, through the discoveries of Columbus, began a new life and history for the western hemisphere. In many schools Columbus Day is celebrated with appropriate exercises, and in these volumes, on page 1504, suitable programs are suggested.

But the day of days for children in this month is Hallowe'en, which falls on the last day of the month. It has no historical significance, but the wise teacher will know how to connect it with the work of the children so that it shall have a real value. Suggestions for Hallowe'en observance will be found on page 2671, in Volume IV.

OCTOPUS, *ok' toh pus,* a genus of deep-sea animals, of repulsive and frightful appearance. The soft, pear-shaped body of the animal is joined to the head by a short neck, and encircling the mouth are eight movable arms, on each of which there are two rows of powerful suckers. The arms are connected at the base by a web. It is these arms that give the creature its name, for *octopus* is derived from Greek words meaning *having eight arms.* The octopus cannot swim, but moves along the sea bottom by means of its arms. It lives in coral reefs and among rocks and is most common in the Mediterranean and Asiatic seas, although it reaches its greatest size on the Pacific coast—sometimes fourteen feet from tip to tip of extended arms. Generally the length of arm in the largest specimens is from three and one-half to four feet. The food of the octopus consists of crabs and other small shellfish.

Divers along coral banks are sometimes caught by the arms of these animals, and death is caused by strangulation, drowning or fright. It is possible to loosen the grip of an octopus by seizing it on either side of the mouth and

turning it inside out, but it is said that the hideous appearance of the animal is so terrifying that a victim is usually rendered helpless.



THE COMMON OCTOPUS

The Chinese and Italians, who seek the octopus for food, catch the animal by running a pointed stick through the body.

For description of the class to which the octopus belongs see the article CEPHALOPODA.

ODD FELLOWS, INDEPENDENT ORDER OF, a benevolent and fraternal order which is in many ways akin to Freemasonry (see MASONRY), but which has several distinctive features. As to its origin there is uncertainty, though it was founded in England, probably not before the eighteenth century. The idea of mutual relief and benefit to members, cardinal features of the order, attained great popularity, and various branches or lodges grew up in different cities of England, each of which refused to admit the superior rank of any other. In time adjustments were made, but it was not until 1814 that the Manchester Unity of the Independent Order of Odd Fellows was finally organized. This society, which has branches in various countries but has no present connection with the order in the United States, has about 1,332,000 members.

The American Order. Odd Fellowship in the United States dates from 1819, when Washington Lodge was organized in Baltimore. This became in the next year a subordinate lodge in the Manchester Unity, and other lodges which were established in the United States in the following years assumed a like position. In 1843, however, the affiliation with the English lodge ceased, and the United States grand lodge reserved for itself the right to erect lodges in Europe. For a time the Canadian branch had a separate charter, but after 1852 the society in Canada was merged with the grand lodge of the United States.

Objects. The Order of Odd Fellows adheres to the rites, passwords and grips which are characteristic of all secret societies, but its primary purpose is, as it always has been, benevolent. Since 1830 the society has paid out in relief funds nearly $190,000,000, to 1921. This includes no life insurance, for which there is provision. Several of the symbols of the society are well known—the three links, representing friendship, love and truth; the skull and crossbones, speaking of mortality, and the eye, which represents the omniscience of God.

The subordinate lodge confers three degrees, and when a man has attained the highest of these he becomes eligible to membership in an encampment, which in its turn confers three degrees, the Patriarchal, Golden Rule and Royal Purple; the first-named is an English degree. Since 1884 there has existed a military or uniformed degree, the Patriarch Militant, to which are eligible holders of the Royal Purple degree.

Women who are related to Odd Fellows are admitted to a Rebekah lodge, which was organized in 1851, and which had, in 1921, 925,000 members. The Independent Order of Odd Fellows, which has grand lodges in Australia, Denmark, Germany, the Netherlands, Sweden and Switzerland, had, in 1916, a total membership of 1,606,546 in the United States.

Consult Ford's *Symbolism of Odd Fellowship;* Stevens' *Cyclopedia of Fraternities.*

ODE, the name given by the Greeks to any poem that was sung to a musical accompaniment. Two forms of odes were common among the Greeks, that in which the stanzas were regular and uniform, and that in which irregular divisions, known as strophe and antistrophe, were intended to be sung by two choirs answering each other. The famous odes of Sappho were of the former kind, those of Pindar of the latter, while Horace's odes followed those of Sappho rather than those of Pindar.

In modern poetry the ode is not usually intended to be sung, though it is classed with lyric poetry. It is, in general, rather long, dignified in subject-matter and in style, and addressed to some person or thing. Although the strophe and antistrophe idea is not present in the modern ode, there is in English, as there was in Greek, a regular and an irregular style of ode. Shelley's *Ode to a Skylark,* Bryant's

To a Waterfowl, Keats's *Ode on a Grecian Urn,* for instance, belong to the regular odes, while Dryden's *Ode for Saint Cecilia's Day,* Wordsworth's *Intimations of Immortality* and Tennyson's *On the Death of the Duke of Wellington* are of the irregular order. The ode is often closely allied to the elegy.

ODENSE, *o'then sah,* the birthplace of Hans Christian Andersen, is a seaport of Denmark, situated on the island of Fünen, four miles inland from the Fiord of Odense, with which it is connected by a canal. The main part of the town is on the north side of the Odense Aa (river), but the manufacturing quarter, called Albani, is on the opposite bank. Here are the large iron foundries, tanneries, machine shops, sugar refineries, glass, chemical and tobacco factories and weaving mills, and here is carried on a thriving trade in butter, bacon, cheese and eggs. Odense is one of the oldest cities of Denmark, and in the sixteenth century several important parliaments were held there; during the Middle Ages the shrine of Canute, the patron Saint of Denmark, was visited by many pilgrims. In 1921 the city had a population of 49,469; it ranks fourth in size among the cities of the kingdom, being smaller than Copenhagen, Aalborg and Aarhuus.

O'DER, one of the principal rivers of Germany, rising in the southeastern part of that country and flowing northwest, emptying into the Baltic Sea. It is 550 miles long, and for the greater part of its course it is navigable. Some of the towns which lie on its banks are Stettin, Posen and Breslau. The Kaiser Wilhelm Canal, sixty-two miles in length, has been built to connect the Oder River with one of the tributaries of the Elbe, thus forming an important link in the chain of waterways in Germany. This canal, commonly known as the Kiel Canal, was built especially for military and naval purposes, but was ordered open to all the world by the peace conference in 1919. See Kaiser Wilhelm Canal.

ODESSA, *o des'a,* one of the newest cities of Russia, fourth in population among the cities of the country, and the foremost seaport of Southern Russia. It is located in the government, or province, of Kherson, on the Black Sea, thirty-two miles northeast of the mouth of the Dniester River, ninety miles southwest of Kherson, 938 miles southwest of Moscow, and about 400 miles by water northeast of Constantinople. This attractive, modern city, with its broad, regular streets, beautiful squares and imposing buildings, is justly regarded as the commercial and educational center of New Russia. The great harbor, which is divided by moles into six ports, can accommodate the largest ocean ships, and in normal years it is entered by over 700 vessels yearly. Odessa is the chief port of export (chiefly grain and flour) for Russia, and ranks next to Reval and Petrograd in value of imports.

The University of New Russia, founded in 1865, is at the head of the city's educational institutions, and there are in addition numerous preparatory, commercial, industrial and art schools. Theaters, a municipal library and many handsome churches are other notable features of this city, which is also the see of an archbishop of the Greek Church, the headquarters of an army corps and the home of several learned societies. Industrially, Odessa is of importance as a manufacturing center, its chief establishments including flour mills, sugar refineries, breweries, tanneries, ironworks and manufactories of matches, textiles, chemicals, starch and soap.

The city is built on the site of a Greek settlement, Odessus, from which its name is derived, but is the outgrowth of a fortress erected by the Turks in the fifteenth century and captured by the Russians in 1789. After 1817, when it was declared a free port, the place enjoyed rapid growth, and is continually expanding by the addition of suburbs. Stubborn fighting for possession of Odessa occurred in 1918. The Germans took it on March 13, but lost it again on the 27th. Population, 1913, 631,040.

O'DIN, the chief god of the ancient people of Northern Europe, as Zeus was the chief god of the Greeks. The Scandinavians called him *Odin;* the Germans called the same god *Wuotan* or *Wodin.* He was the father of all the gods of Norse mythology, and was the personification of universal wisdom and victory. His great son, *Thor,* was the god of war, thunder, and agriculture. Many legendary kings and noble families, as well as gods, were said to be descended from Odin. His court was held in Asgard, as Zeus held court in Olympus. Valhalla, the hall of the chosen slain, was one of the most important palaces in Asgard. The earliest form of worship of both Odin and Zeus was human sacrifice. In earliest times, Odin was a god of the common people but later was worshiped principally by warriors and members of noble families. Wednesday received its name from Odin. See Mythology.

ODOACER, *o doh a'ser* (434-493), the first barbarian ruler of Italy, was born in the district

bordering the Danube. Though his parentage is uncertain it is probable that he was the son of Aedico, a chief of the Scyrii. When about thirty years of age Odoacer left his country and entered the service of Italy. In the year 475 the Emperor Nepos was driven into exile by the rebel Orestes, who placed his son, a lad of fourteen, on the throne. The new emperor, Romulus Augustus, as he was called, was a weakling, and Odoacer, who had risen to power and position among the barbarian mercenaries, offered the latter one-third of Italy if they would place him on the throne. Orestes, who exercised the real power while his son nominally ruled, was made prisoner and beheaded; Romulus was dethroned, and Odoacer was accepted as king.

For thirteen years he ruled with undisputed power, and although a barbarian and hated by the native Italians, he ruled them justly and well. He divided one-third of the country among his followers, and to strengthen his position appealed to the Byzantine empire for support and sanction of his rule as king, declining to adopt the higher title of emperor. The Byzantine emperor, Zeno, while pretending to be satisfied with Odoacer's claims and conferring on him the title of Patricius, instigated an invasion of Italy by Theodoric, the Ostrogoth king. Odoacer was defeated and retired to Ravenna, which he had chosen as his kingly residence. He agreed to capitulate upon Theodoric's promising to share the kingdom of Italy with him. Inviting him to a banquet to ratify the agreement, Theodoric slew him with his own hand.

ODYSSEY, *od'i si,* a famous epic, usually considered the work of the Greek poet Homer, in which are described the wanderings and the sufferings of Ulysses on his return from the Trojan War. With his followers he set sail, intending to return at once to his kingdom of Ithaca, but from the very first troubles and dangers beset him. His ships landed at Ismarus, where lived the Ciconians, a part of whose wealth Ulysses planned to carry off with him; but his followers preferred to engage in all sorts of revelry, and while so occupied they were set upon by the Ciconians, and many of them were put to death. Leaving Ismarus, they were driven by a storm to the country of the Lotus-Eaters, where some of Ulysses' men were determined to remain, and whence they were carried only by force. Sicily was the next place they approached, and here Ulysses landed with twelve of his companions, leaving the others at an island not far distant. Taking refuge in the cave of the Cyclops Polyphemus, Ulysses outwitted him and put out his one huge eye, but only after several of the Greeks had been devoured.

By his treatment of the Cyclops Ulysses had won the hatred of Neptune, father of the monster, and his perils on the sea redoubled. At first it seemed as if he was to have respite, for Aeolus, father of the winds, received him kindly at the Aeolian Isle, and gave him a leather bag, in which were shut up all the contrary winds. These being safely out of the way, the ships were carried by favoring breezes within sight of Ithaca; but the sailors, believing that the huge bag which Ulysses guarded so carefully contained great riches, stole it and opened it, loosing the contrary winds. A storm was the immediate result, and the ships were driven to the land of the cannibal Laestrygones, who put to death many of the followers of Ulysses. Escaping in haste, Ulysses with his remaining men came next to the island of Aeaea, where lived the beautiful enchantress Circe. By her arts she turned most of the companions of Ulysses into swine, and would have made a fox of the crafty leader had he not been aided by Mercury. After tarrying for a year in the enchanted isle, Ulysses went, by the advice of Circe, to the lower regions, where he received suggestions as to his future course.

Sailing by the island of the Sirens, and passing in safety Scylla and Charybdis, he came to Trinacria, where his companions begged to be allowed to rest. Ulysses consented, first obtaining their promise that they would not kill any of the sacred cattle of Apollo which were kept on the island. They broke their promise, however, and as a punishment all except Ulysses himself were put to death. Saddened and lonely, the leader voyaged to the island of Calypso, where he was forced to remain for eight years, as his ship had been destroyed. Finally Mercury appeared to Calypso and commanded her to let Ulysses go, and to aid him in building a raft. This structure was destroyed by the wrath of Neptune, and Ulysses was washed ashore in Phaeacia, where he was discovered by Nausicaa, daughter of the king. After listening to the tale of his wanderings, the king sent him home to Ithaca in a Phaeacian ship. Arriving there, he found his wife and son suffering from the persecutions of the suitors of Penelope, but he speedily overthrew the wicked and greedy youths and established himself once more in his kingdom.

The *Odyssey,* like the *Iliad,* is in twenty-four books. Though, like the other great epic, it is attributed to Homer, the same question as to its real authorship exists. By many scholars it is believed that the *Odyssey* is an outgrowth of the tales of early navigators who dared the dangers of the Mediterranean, though it is by no means certain that it has even that basis in history. However that may be, it remains one of the world's great classics, and a tale of absorbing interest to those who love to read of adventure. A.MC C.

There have been no notable popular translations of the *Odyssey* within recent years. Probably the best is Hayman's, published in 1882, although any bookstore can furnish acceptable translations for the general reader.

Related Subjects. The reader who is interested in the *Odyssey* will find the following articles in these volumes very helpful to him:

Calypso	Penelope
Circe	Polyphemus
Epic	Troy
Homer	Ulysses
Iliad	

OEDIPUS, *ed'ipus,* a most unfortunate hero of Greek legend. Because it was foretold that the son of Laius, king of Thebes, should kill his father, marry his mother and bring trouble on his native city, the father ordered his child to be exposed in an open place. The servant appointed tied the infant's ankles together and fastened him to a tree, feeling sure that hunger or the wild beasts would soon end his life. A shepherd of King Polybus of Corinth, however, found the boy and carried him to Polybus, who adopted him as his own son, calling him Oedipus (meaning swollen foot). Years later an oracle repeated the prophecy of disaster, of which Oedipus had up to that time known nothing; and to avoid being led into such crimes, Oedipus left Corinth and the foster-parents whom he thought his real father and mother. As he wandered along the road to Thebes he met King Laius, whom, after a hasty quarrel, he killed with his attendants, never suspecting that the old man was the king of Thebes. Having guessed the riddle of the Sphinx, Oedipus was given the promised reward —the throne of Thebes, with Queen Jocasta as a wife. Thus he had fulfilled two parts of the prophecy.

For some time the king and queen lived happily together, and four children, Eteocles, Polynices, Antigone and Ismene, were born to them. Then a plague came upon Thebes, and the oracles when consulted declared that it should cease only when the murderer of King Laius was sought and punished. Gradually the whole pitiful story was disclosed and Jocasta, in despair, hung herself, while Oedipus put out his eyes that he might look upon no more horror. Then he wandered forth, with Antigone for his only companion, and together they journeyed until they come to Colonus. Here Oedipus bade his daughter farewell and entered a gloomy forest which was sacred to the Furies. As he never reappeared, it was believed that these deities had carried him away. Sophocles's *Oedipus Tyrannus* and *Oedipus at Colonus* deal with the story of this most unfortunate of kings.

OG'DEN, Utah, the county seat of Weber County, and, next to Salt Lake City, the largest city in the state, is an important railway and distributing center, sixteen miles east of Great Salt Lake and thirty-six miles north of Salt Lake City. It is at the junction of the Weber and Ogden rivers and is on the Denver & Rio Grande, the Oregon Short Line, the Southern Pacific and the Union Pacific railroads, and is also served by electric lines to Salt Lake City and other places. The population, which in 1910 was 25,580, was 32,804 in 1920, a gain of 28 per cent.

Ogden occupies an area of nearly seventeen square miles, and lies at the foot of the Wasatch Mountains. Several deep canyons of picturesque beauty are near the city and attract many visitors. The falls of Weber River generate electricity for light, heat and power in Ogden and Salt Lake City. Prominent buildings are the county courthouse, the city hall, the Federal building, constructed at a cost of $200,000, the Forestry building, Carnegie Library, Masonic Temple, Elks' Home, Dee Hospital and several fine churches. Ogden is the seat of Weber Stake Academy (Mormon), of Sacred Heart Academy (Roman Catholic), of state institutions for the deaf, dumb and blind and of the state industrial school (reformatory). There are four small, attractive parks.

Ogden is a wholesale center and, with Salt Lake City, supplies Utah, Eastern Nevada, Western Wyoming and several sections of Idaho and Montana with groceries, hardware and dry goods. The pay roll, in Ogden, of the railroads entering the city is about $4,500,000 annually. The industries are supported by a rich agricultural and sheep and cattle country and consist in meat packing, with an output worth $4,000,000 a year, the manufacture of beet sugar, cans, overalls, shirts, cement, brooms, cereals and evaporated fruits, and the canning of fruits and vegetables. In 1916 rich

zinc mines were opened on a peninsula in the Great Salt Lake.

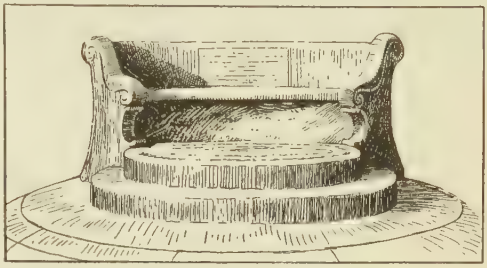
The organization of Ogden was directed by Brigham Young in 1850; the town was chartered in 1851 and rechartered in 1861. The commission form of government has been adopted. J.B.L.

OGDENSBURG, N. Y., a city in Saint Lawrence County, situated on the northern border of the state, on the Saint Lawrence River, which at this point is more than a mile wide. Here it receives the waters of the Oswegatchie River. Brockville is twelve miles southwest, and Watertown is sixty-five miles southwest. Plattsburg is 143 miles east, and Montreal is 150 miles northeast. The city has exceptional transportation facilities; there is steamer communication with all important lake and river ports, and direct connection by rail with New York and Boston, the New York Central & Hudson River and the Rutland railways serving the city. Ogdensburg was settled in 1749, was incorporated as a village in 1817 and received its city charter in 1868. The population decreased from 15,933 in 1910 to 14,609 in 1920, a loss of eight per cent. The area of the city exceeds four square miles.

Several fleets of vessels are owned here. Shipping and wholesale trade in grain, lumber, produce and manufactured products are the sources of the city's prosperity. Large quantities of silk are received from the Orient through Canada and sent directly to the silk mills of the Eastern states. The leading manufactures are lumber products, silk shirts, flour, gloves, leather and brass goods. Many of the industrial establishments utilize the water power afforded by the river.

Ogdensburg has a $265,000 Federal building, a fine town hall, a state armory, a Roman Catholic cathedral, and the Saint Lawrence State Hospital, one of the best equipped institutions in the United States for the treatment of the insane. In addition to its public schools, it has Saint Mary's Academy, Ogdensburg Free Academy and a public library, which occupies a beautiful site on the river front. The famous rapids of the Saint Lawrence River begin with the Galop Rapids, seven miles below Ogdensburg, and end with the Lachine Rapids above Montreal. To the famous Thousand Islands district is a two-hours' ride by boat. W.E.W.

OGLETHORPE, *o'g'l thorp,* JAMES EDWARD (1696-1795), an American colonist, founder and first governor of Georgia, was born in London. He entered the British army at the age of fourteen and served in campaigns against the Turks in 1716 and 1717. Five years later he became a member of Parliament and proposed to that body the establishment of an American colony for debtors in English prisons. In 1732 he received a charter from George II for the territory now comprising Georgia, while Parliament granted him $50,000 for expenses. In January,



OGLETHORPE SEAT

Monument marking the spot in Savannah where Oglethorpe landed in America, in 1733.

1733, he arrived in America with 120 colonists and established his first settlement where Savannah, Ga., now stands. He ruled for nine years with undoubted wisdom, drove the invading Spanish back into Florida, and in 1742 defeated them so badly at Frederica, Ga., that the colony was safe from further hostilities.

In 1743 Oglethorpe found himself so heavily in debt because of his loans to colonists that he was compelled to return to England. There his enemies tried to convict him of cowardice in not capturing Saint Augustine, but he justified himself. With the other trustees of Georgia he resigned the charter to England in 1752, and the colony became a royal province. A book entitled *A True and Historical Narrative of Georgia,* written in 1740 by three Georgia exiles, Tailfer, Anderson and Douglas, against the methods of Oglethorpe, is considered the first printed protest of Americans against the British colonial policy.

Oglethorpe University. The original institution bearing this name was founded at Atlanta, Georgia, in 1835, but was obliged to close its doors during the War of Secession. In 1913 a successful campaign was begun for funds for a new Oglethorpe University, which was opened in 1916. It is regarded as a continuation of the earlier ones.

Consult Cooper's *James Oglethorpe, the Founder of Georgia;* Bruce's *Life of General Oglethorpe,* in Makers of America Series.

O. HENRY, the pen name of WILLIAM SYDNEY PORTER, an American humorist and story writer. See PORTER, WILLIAM SYDNEY.

HIO, one of the north-central states of the American Union, named after the river which borders it on the south and southeast. The name is a contraction from the Iroquois Indian word *Ohionhiio,* which means *beautiful river.* In population, wealth, natural resources and manufactures Ohio is one of the leading states in the Union. It has been the birthplace of six Presidents of the United States, surpassing in this respect all other states except Virginia, where eight Presidents have been born. Ohio has acquired the nickname of the Buckeye State, on account of the great number of buckeyes, or horse-chestnut trees, which are found there. This nickname came into general use during the Presidential campaign of 1840, when General William Henry Harrison, a citizen of Ohio, was the successful candidate. A cabin made of buckeye logs was a prominent feature of the campaign, which has gone down in history as the "hard-cider and log-cabin" campaign. In a popular song of the period this cabin was spoken of as "a token and a sign of the bonnie 'Buckeye State.'" The carnation is considered the state flower.

Size and Location. In size Ohio, with an area of 41,040 square miles, ranks thirty-fifth among the states of the Union. The state nearest to it in size is its neighbor, Kentucky, which is 442 square miles smaller. Ohio is more than double the size of the Canadian province of Nova Scotia, and it has a population nearly ten times as large. The nearest approach to this state in size among the European countries is Greece, which, as a result of the additions of territory gained after the Balkan Wars of 1912 and 1913, has about the same area and population. Ohio is irregular in shape. Its northern boundary is formed by Lake Erie, the lake shore extending for a distance of 230 miles. The Ohio River, which in a winding course of 436 miles separates it from Kentucky and West Virginia, forms the southern and southeastern boundaries. The greatest breadth of the state from north to south is 210 miles, and the greatest length from east to west is 225 miles.

Its People. In population Ohio, with 5,759,394 inhabitants in 1920, ranks fourth among the states. The reported population January 1, 1910, was 4,767,121, nearly double that of the Canadian province of Ontario, which since 1912 has had an area nine times as large. With an average number of 141.4 persons to the square mile in 1920, it ranks eighth among the states in density of population, and has about four times as many people to the square mile as the United States as a whole. Of its total population, 63.6 per cent are native whites of native parentage. Of the foreign-born population, 29.3 per cent came from Germany, a number more than twice that contributed by any other country. The bulk of the other foreign nationalities consists of Austrians, Hungarians, Russians, Italians and Irish.

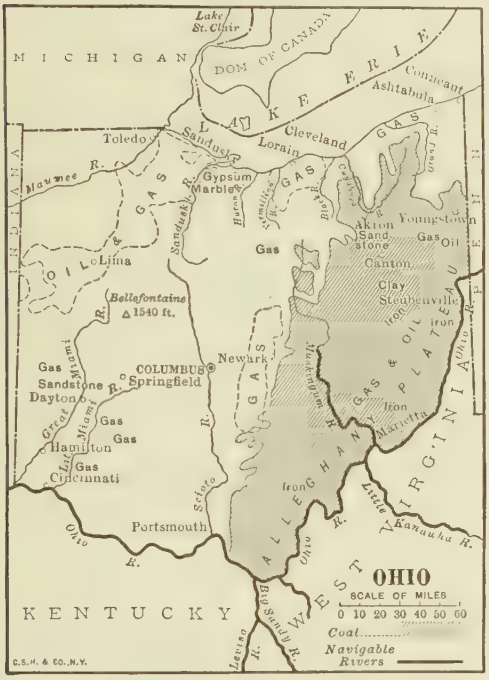
In 1920 nearly sixty per cent of the population lived in towns of 2,500 inhabitants or more, as compared with an urban population of 47.2 per cent in 1910. The increase in the town population during the first decade of the twentieth century has been very marked, not only in Ohio, but throughout all the states of the Union, most of the provinces of Canada and many countries of Europe.

Cities. Ohio has a large number of cities. Chief among them are Columbus, the capital; Cleveland, the most populous, and sixth in population among the cities of the United States; Cincinnati, Toledo, Dayton, Akron, Canton, Hamilton, Lima, Lorain, Newark, Springfield, Youngstown and Zanesville, and others of very considerable local importance. (See index at end of this article.)

Education. The provisions made by the state of Ohio for the education of the children are good, and several important improvements have been introduced since 1914. Adequate compulsory education and child-labor laws are in force. All children between the ages of eight and fourteen must attend school during the whole time the schools are open. Children between the ages of fourteen and sixteen who are not employed and who cannot read or write

English are also compelled to attend school. The cost of education is met mostly by local taxation, supplemented by grants from the state.

The schools are under the supervision of a superintendent of public instruction, who is appointed by the governor for four years. The local unit of school organization is the school district, which has its own board of education elected by the people. Special measures have



OUTLINE MAP OF OHIO

Showing boundaries, navigable rivers, chief cities, international boundary, coal, oil and gas areas and the highest point of land in the state.

been taken in this state for the consolidation and centralization of rural schools, in order to give the residents in the country the school advantages of those residing in cities. Ohio was among the first states to adopt the township school system, and has carried it to greater success than has any other state. There is now in force a law which standardizes such schools throughout the state. In each township operating under this law all the children attend one school, at a central point, and are conveyed to and from their homes at public expense. Agriculture is a subject taught in all common schools except those situated in city school districts.

Illiteracy. In 1920 there were 131,006 persons ten years of age or over who could not read or write; this represents 2.8 per cent of the total population, as compared with 3.2 per cent in 1910. But among native whites the percentage of illiteracy was only 1 per cent; it was 12.6 per cent among foreign-born whites, and 8.1 per cent among negroes.

Universities and Colleges. Ohio has many universities and colleges, though some of them are little more than secondary schools. There are three state universities, situated respectively at Columbus, Athens and Oxford. Other institutions are the Northern University at Ada; University of Akron at Akron; Western Reserve University at Cleveland; Ohio University at Delaware; Heidelberg University at Tiffin; Otterbein University at Westerville; University of Wooster at Wooster; University of Cincinnati at Cincinnati; Denison University at Granville; Findlay College at Findlay; Kenyon College at Gambier; Hiram College at Hiram; Oberlin College at Oberlin; Wittenberg College at Springfield; Muskingum College at New Concord; Saint Xavier College at Cincinnati; and Antioch College at Yellow Springs. Colleges for women are the Oxford College for Women and Western College for Women, both at Oxford, and Lake Erie College at Painesville. All of these institutions are maintained by various religious denominations. Also worthy of mention is the Case School of Applied Science at Cleveland, one of the best technical schools in the country.

For the training of teachers the state maintains normal schools at Akron, Athens, Cleveland, Columbus, Dayton, Oxford and Toledo.

Religion. Ohio has an unusually large number of religious sects. The strongest Church is the Roman Catholic, to which about one-third of the whole population belongs. The most numerous of the Protestant sects are the Methodists, whose number is about half that of the Roman Catholics. The Presbyterians and the Lutherans come next, each with about one-third of the number possessed by the Methodists. Other sects, in the order of their numerical strength, are the Baptists, Disciples of Christ, United Brethren, Congregationalists, German Evangelicals, Protestant Episcopalians, Christian Scientists and Evangelicals, besides other minor bodies.

Physical Features. Eastern Ohio is a part of the great Alleghany plateau, while the western part of the state belongs to the prairie region. In general the surface may be described as an extensive and moderately-undulating plain which has a mean elevation of about 850 feet

above the sea. There are no mountains in the state, but there are many hills. The highest point is Hogues Hill near Bellefontaine, a little west of the center of the state, with an altitude of 1,540 feet; the lowest, only 425 feet high, is at the mouth of the Great Miami River, in the extreme southwestern corner. Many of the rivers flow through deep valleys, and their banks have a remarkably bold aspect, adding greatly to the charm of the landscape. The Ohio River flows through a narrow valley which is nowhere more than two miles wide. In this valley there are many hills or bluffs which rise abruptly to a height from 200 to 500 feet above the bank of the river. The most picturesque of the valleys in Ohio is that of the Muskingum.

Rivers. The rivers of the state flow either north into Lake Erie or south into the Ohio River. A height of land, formed by a series of hills with an average elevation of only a few hundred feet above the surrounding country, constitutes the divide. This extends in an irregular direction across the state from near the northeastern corner to a point a little north of the middle of the western boundary. The chief rivers flowing into Lake Erie are the Maumee, the Sandusky, the Cuyahoga and the Grand. The chief streams flowing into the Ohio, which are longer and wider than those flowing north, are the Great Miami, the Little Miami, the Scioto, the Hocking and the Muskingum.

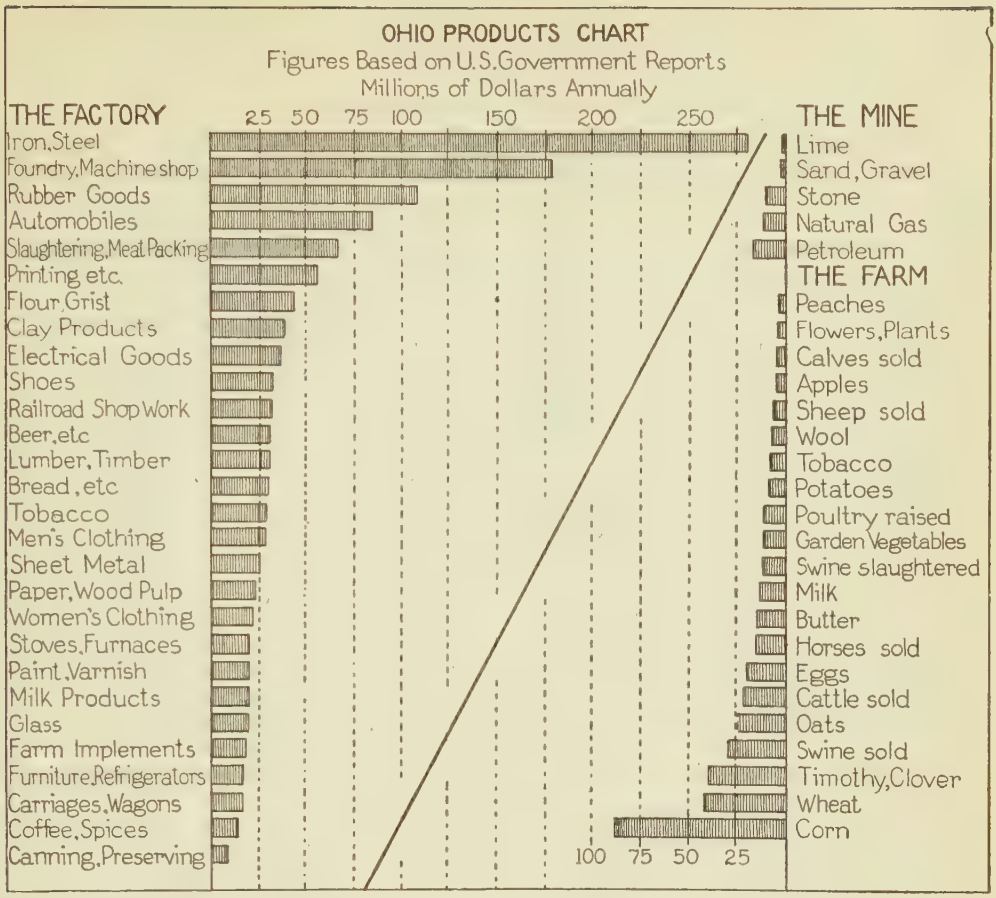
The Muskingum is the longest river lying wholly within the state, and it is navigable for 100 miles. Many of the streams are rapid and furnish water power, a fact which has contributed largely to the establishment and development of manufacturing industries. Near the village of Cuyahoga Falls the Cuyahoga River has a descent of over two hundred feet in three miles. During a portion of its course, called "the glen," this river flows swiftly between steep walls of sandstone which are in places over a hundred feet high.

Climate. Ohio has a continental type of climate, with great extremes of temperature, the summers being very hot and the winters cold. The climate, though varying in different parts of the state, is on the whole healthful. Lake Erie exercises a moderating influence, making the summers cooler and the winters warmer in the counties along its shores. The average temperature for the year is about 51° Fahrenheit, and the southern part of the state is about 4° warmer than the northern section. The rainfall averages 38.5 inches a year, but the greatest amount falls in the south. On the other hand, the snowfall is much heavier in the northern parts of the state, so the precipitation is fairly even.

Resources of the State

Agriculture. Ohio is one of the foremost agricultural states in the Union. It ranks fourth in the value of its crops, these amounting to over $230,000,000 yearly. This high rank is due to favorable physical conditions. It has a gently-rolling surface, broken by river valleys; a fertile soil, especially in the western part of the state; a suitable climate, and ample rainfall. As a result of these advantages 92.5 per cent of the total land area of the state, which is 26,073,600 acres, is included in farms, and of this amount about four-fifths is improved land. The total value of farm property, excluding domestic animals, is about $2,000,000,000. The average size of a farm is 88.6 acres, and the average value of farm land is $53.34 per acre, according to census reports. The products of the state are varied, but the chief crops raised are corn, hay, oats, wheat and potatoes. By far the most important crop, both as regards area under cultivation and value of product, is corn, which covers an area of over 3,750,000 acres and yields a crop of 156,000,000 bushels a year. Next in importance comes hay, producing over 4,000,000 tons. Oats, with an acreage of 1,680,000 acres and a production of over 69,000,000 bushels; wheat, with an acreage of 1,980,000 acres and a production of 40,200,000 bushels; and potatoes, with an acreage of 153,000 acres and a production of 12,550,000 bushels, are the other chief crops.

Great quantities of vegetables and garden produce are raised, which find a ready market in the industrial towns. Nearly 125,000 acres are devoted to these products; in this respect Ohio is surpassed only by New York, but Missouri and Texas have nearly the same acreage. In 1920 Ohio had the largest acreage devoted to onions of all the states of the Union. Tobacco is an important crop in the southwestern counties, and in this respect Ohio ranks first among the Northern states and fourth among all the states of the Union. The production varies from about 60,000,000 pounds to 90,000,000, with a value of from $6,000,000 to



$8,000,000. The state is a large producer of fruit, especially of apples, peaches and grapes; in the number of apple trees it is among the foremost in the Union. Nearly 15,000,000 bushels of apples were produced in 1921, but the output in average years is about 11,500,000. Peaches and grapes thrive in the counties along Lake Erie, where both soil and climate are favorable to their growth.

Live Stock. Ohio ranks with Wyoming, Montana, New Mexico and Idaho as an important sheep-raising state. The southeastern corner of the state, where the hills are often barren and always hard to till, affords excellent grazing for sheep. There were 2,773,000 sheep in 1921, and the annual wool clip is about 12,500,000 pounds. Raising of live stock forms one of the chief occupations of the inhabitants. In 1920 Ohio ranked fifth among the states in the value of live-stock sold and slaughtered on farms, and in live-stock products, which amounted to over $155,000,000. The states leading it were Iowa, Illinois, Missouri and Kansas. The best land suitable for pasturage is situated in the northeastern corner, and there dairy farming has become an important industry. There were 1,009,000 milch cows in 1921.

Forests. This region was formerly covered with dense forests composed mostly of hardwood timber, intermingled with white pine. Most of it was cut down during the nineteenth century but a little over twenty per cent of the whole area is still wooded. The chief trees found are oak, several varieties of hickory, ash, poplar, pine, elm, birch, locust, beech, walnut, chestnut and hemlock. Ohio ranks high among the states of the Union in the production of hardwood timber. The annual cut exceeds 400,000,000 feet, board measure, but this is less than half the amount cut in 1900. The timber serves as raw material for a great number of the state's industries.

Minerals. Ohio ranks fourth among the states of the Union in the value of its mineral products, which averages about $125,000,000 in the year. From this total is excluded the

value of pig iron produced (close to $100,000,000 a year), the ore for which is brought down the Great Lakes. The chief minerals are coal, petroleum, natural gas, clay and salt. With an average production of over 30,000,000 tons of coal a year, Ohio ranks fourth as a coal-producing state, following Pennsylvania, West Virginia and Illinois. The coal fields are situated in the southeastern corner of the state and belong to the Appalachian coal field (see page 1444). The coal mined is bituminous (soft coal), and is of excellent quality. Over 8,500,000 barrels of petroleum are extracted annually, but the production was formerly much larger. Two extensive oil fields are found in this state. One is in the southeastern corner and belongs to the Appalachian oil field, while another one, found in the northwestern part, is known as the Lima oil field. Natural gas, which is found in the oil-field regions, is abundant, although the production has of late years greatly decreased. Clay, suitable for making bricks, tile, pottery and earthenware, is found in large quantities in many parts, and serves as raw material for products, the value of which reaches over $35,000,000 a year.

Quarrying is an important branch of the mining industry, and quarries of excellent building stone are found in many parts of the state. One of the best building stones in the country is the Berea sandstone, named after the city where it is quarried. Imposing public buildings in many large towns have been built of this high-grade stone, which also is extensively used for the making of grindstones. More grindstones are made in Ohio than in all the other states of the Union combined. In the production of salt Ohio ranks third, being surpassed only by New York and Michigan. There are two important salt regions in the state, one in Meigs County in the southeastern corner, and another in the northeastern counties.

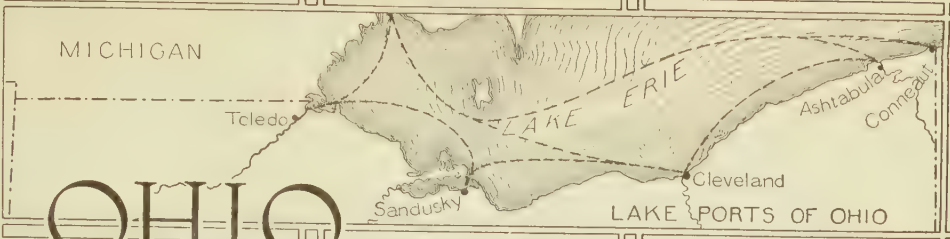
Manufactures. The state ranks fifth among the manufacturing states in the Union, following New York, Pennsylvania, Illinois and Massachusetts. The value of its manufactures is greater than that of agricultural and mining products combined, amounting in 1920 to about $5,101,000,000. Ohio possesses all the conditions favorable to industrial development. It has great natural resources, an abundance of raw material and fuel, excellent water and railroad transportation facilities and an advantageous geographical location. The most important industry of the state is the manufacture of iron and steel, in the production of which it is surpassed only by Pennsylvania The iron ore is brought here by water from the Lake Superior iron region, while a great amount of the coke necessary in the manufacture of iron and steel is brought from Pennsylvania. From 5,250,000 to nearly 7,000,000 tons of pig iron are produced yearly. Allied to the iron and steel industry is the manufacture of foundry and machine-shop products, the next important industry in the state. The chief centers of the iron and steel manufactures are Cleveland, Youngstown, where the first iron works in the state were established in 1804, Ironton, Mingo and Martin's Ferry.

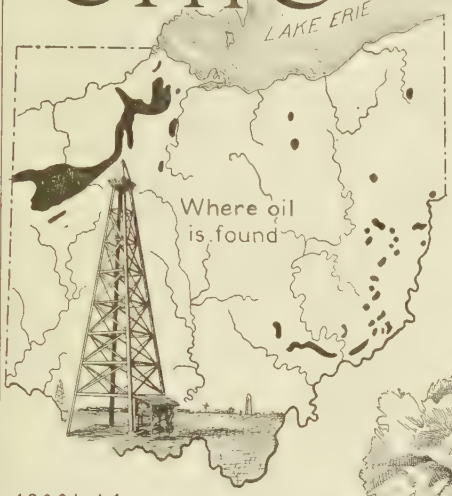
Owing to its abundance of clay Ohio ranks first among the states of the Union in the value and variety of its clay products. These include bricks and tiles for every purpose, sewer pipes and pottery. More than eighty-five per cent of the sewer pipes used in the United States are manufactured in the state. The pottery industry is located for the most part in the valley of the Ohio River, East Liverpool being the most important pottery center in the country. The finest art ware in the United States is produced at the Rookwood Pottery at Cincinnati. This is greatly prized for its exquisite coloring, beautiful decorations and fine glazing.

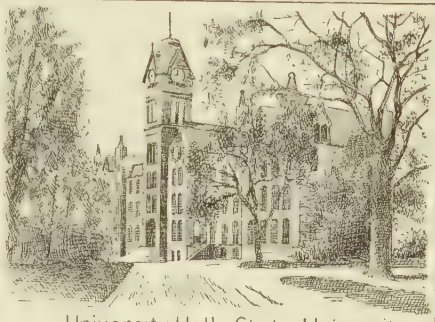
Possessing an abundance of limestone and marl, with the clay above mentioned, Ohio is a large producer of Portland cement.

Slaughtering and meat packing is another important industry, its chief center being Cincinnati. Ohio ranks high in the value of its flour and gristmill products; milling is one of the oldest industries of the state. This state ranks second in the manufacture of glass; the finest cut glass in the country is said to be made at Toledo. Ohio ranks first in the manufacture of carriages and wagons, and second in the manufacture of automobiles, both industries being widely distributed throughout the state. Brewing, distilling and the making of wine are important industries in the order mentioned, but these products are decreasing in quantity of output. Other large industries are printing and publishing, the making of men's clothing, the manufacture of boots and shoes, the manufacture of agricultural implements and tobacco manufactures. Dayton is the largest center in the world for the manufacture of cash registers, while Akron is an important center of rubber goods, especially automobile tires. In both these branches of manufacture the state ranks

OHIO



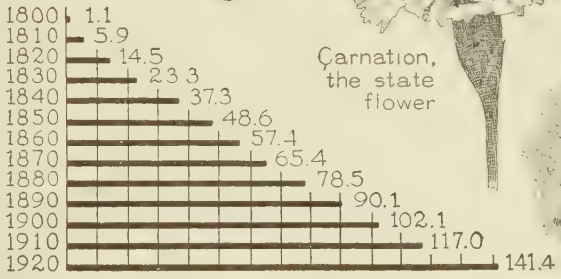




University Hall, State University

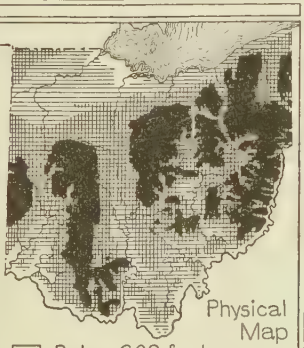
Carnation, the state flower

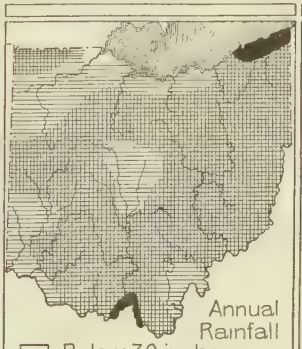
The Buckeye gave Ohio its popular name

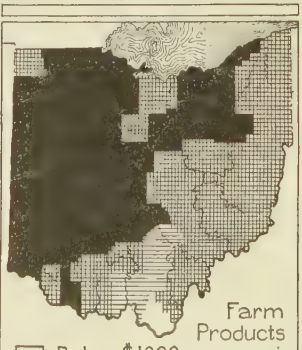


People per square mile, by decades

The Serpent Mound Left by the Mound Builders







first. Ohio surpasses all the other states of the Union in the manufacture of safes and vaults, nearly two-thirds of the output of the whole country being manufactured there, and most of them in Cincinnati.

Transportation. The state has splendid transportation facilities gy rivers, canals and railroads. By means of Lake Erie and the Erie Canal it has direct water communication with the Atlantic coast, and by the lake route communication with the Northwestern states. The Ohio River provides a navigable waterway to the states of the Mississippi Valley and an outlet to the sea at New Orleans. Two canals, crossing the state from north to south and connecting Lake Erie with the Ohio River, were built early in the nineteenth century. One of these, the Ohio Canal, joins Cleveland and Dresden, passing through Columbus, and the other, the Miami and Erie, is between Toledo and Cincinnati. Besides these water facilities, Ohio is traversed by all the principal trunk lines that run from the east to Chicago and Saint Louis, so every part of the state is served by one or two railroads. The state has over 9,300 miles of railroad and over 4,000 miles of electric lines, ranking next to New York and Pennsylvania in electric mileage. The chief railroads are the New York Central lines, including the Cleveland, Cincinnati, Chicago & Saint Louis; the New York, Chicago & Saint Louis; the Pennsylvania lines; the Baltimore & Ohio; the Wabash; the Hocking Valley; the Cincinnati, Hamilton & Dayton; the Erie, and the Detroit, Toledo & Ironton. There is a public service commission, which has power to supervise and regulate public utilities and railroads, and to examine and fix rates. Public utilities companies are forbidden to give rebates or unjust or unreasonable preferences.

Government and History

Government. Ohio is governed under a constitution adopted in 1852, which is the second since its admission to the Union. This constitution has been amended several times, the last being in 1912. An amendment may be proposed in either house of the legislature and must be approved by three-fifths of the members of each house and by a majority of the people. Counting from 1912, the question whether a convention to revise, alter or amend the constitution shall be convened may be submitted to the people at the general election every twenty years.

Five executive officers, the governor, lieutenant-governor, secretary of state, treasurer and attorney-general, are elected for two years, and the auditor is chosen for four years.

The legislative power is vested in a senate composed of thirty-three members and a house of representatives composed of 123 members, elected for two years. Regular sessions are held every second year, starting the first Monday in January in odd-numbered years, and are not limited as to their length. Ohio sends twenty-two members to the United States House of Representatives.

At the head of the judicial department is the supreme court, which consists of seven judges, elected by the people for six years. The state is divided into appellate districts, and in each of these there is a court of appeals consisting of three judges, elected for six years. Each county has a court of common pleas, with judges elected by the people for six year terms.

Since 1912 the cities have enjoyed what is equivalent to municipal home rule. Any town with a population of 5,000 inhabitants or more may frame and adopt a charter for its incorporation as a city, and any city may adopt the commission form of government. The initiative, the referendum and the recall of all elective officers have been adopted in the government of cities. Statutes for the government of municipalities, other than general laws, must be approved by a popular vote before they become operative in a municipality.

STATE SEAL

Other Provisions. Ohio has adopted the primary election law for the nomination of all state, county and municipal officers; it has also adopted the referendum and initiative for all state legislation and the recall of all elective officers, including members of the legislature. Emergency measures passed by two-thirds of the members of each house are not subject to referendum. For dealing with the liquor traffic the state has adopted local option. In 1914 the unit of local option was changed from the county to the township and munici-

RESEARCH QUESTIONS ON OHIO

(An Outline suitable for Ohio will be found with the article "State.")

How many Presidents were born in this state?

Name them and give the dates of their administrations.

How many mounds were left by the Mound Builders within this territory? Who were the Mound Builders, and why did they raise these curious structures?

What is the longest river that lies wholly within the state? How have the rivers helped in the industrial development?

How does Ohio help the mechanics of the country to sharpen their tools?

What is "Inscription Rock," and what is the story it tells?

What part did this territory and its affairs play in causing the French and Indian War? (See FRENCH AND INDIAN WARS.)

How high is the "great divide" of this state? What part does a divide have in determining the physical features of a region?

How many states surpass this in total value of mineral products? How many surpass it in the production of its chief mineral substance?

How long has it been since anyone was put to death in this state for the commission of a crime?

How much higher is the highest point in the state than the lowest? How do these two points agree in altitude with those in Iowa? With those in Kansas?

What valuable product besides timber do certain of the trees of Ohio furnish?

How many constitutions has the state had? How long will it be before a convention to revise the constitution may be summoned?

Among which class is there the larger percentage of illiteracy, the native whites, the foreign-born whites or the negroes?

In what industry does Ohio rank with some of the great states of the West? In what way is it well fitted for this industry?

Turn to the map of the United States and determine why it is that Ohio is crossed by so many trunk lines of railways.

What is the railroad mileage of the state to each hundred square miles of area? How does it rank in this respect with Pennsylvania? With New York? With Illinois?

How many states have a larger population? How many of these more populous states are larger? (See table in article UNITED STATES.)

In the production of what crop does Ohio rank first among all the Northern states? How many of the Southern surpass it?

What article that is made in Dayton does every merchant want in his store? How does this state help people all over the country to keep their valuables safe?

How many states are smaller than Ohio? What country of Europe closely resembles this state in size and population? How long has it done so?

What specially fits it for the manufacture of pottery, bricks and tiles?

How many states came into the Union after the close of the Revolutionary War and before Ohio was admitted?

What does the state name mean?

What is the popular name, and why was it given?

What significance has the phrase "log cabin and hard cider" in the history of the state and of the country?

What fits Ohio to become a great manufacturing state?

pality. Several statutes have been adopted for the protection of the labor of women and children. The state has a workmen's compensation act. There are also provisions for widowed mother's pensions.

Capital punishment in the state is by electrocution. In civil cases a verdict can be rendered by the jury when three-fourths of its number agree. Eight hours a day and forty-eight hours a week constitute a maximum period of labor on public works. In 1920 for the first time the women of Ohio will vote in Presidential elections. Prohibition was voted in 1917.

Charitable and Penal Institutions. The state maintains asylums for the insane at Cleveland, Toledo, Massillon, Columbus, Athens, Dayton and Cincinnati. There is a hospital for epileptics at Gallipolis; an institution for feeble-minded youths, a school for the blind and an institution for the education of the deaf are located at Columbus. The state maintains a home for soldiers and sailors at Sandusky, and a home for the orphans of sailors and soldiers at Xenia. There is a national home for soldiers and sailors near Dayton.

The state penitentiary is at Columbus; a reformatory for males at Mansfield; an industrial school for boys near Lancaster; and an industrial home for girls near Delaware. Ohio has adopted a juvenile court law. All sentences to the state reformatory and to the state penitentiary are indeterminate.

Early Settlements. Ohio was discovered by La Salle, in 1670, and the French took formal possession of the whole Northwest in the following year. A few years later conflicting claims arose between the French and the English regarding this territory. These were finally settled by the Treaty of Paris of 1763, by which France surrendered to Great Britain all its lands as far west as the Mississippi. In 1787 the Ohio Company was organized in New England by soldiers who had served in the War of the Revolution, among whom Manasseh Cutler and Rufus Putnam were conspicuous. This company purchased from the government a large tract of land in the territory northwest of the Ohio River. This was the first public sale of land by the United States government. In connection with its sale, the famous Ordinance of 1787 was passed.

As a Territory. Ohio became now a part of the Northwest Territory. In 1788 Marietta, which is considered the oldest settlement in the state, was founded; in the following year Cincinnati was founded. A series of Indian uprisings disturbed the development of this territory, but in 1794 General Anthony Wayne gained a decisive victory over the Indians at the Battle of Fallen Timbers, on the Maumee River. In the treaty concluded with them in the following year the Indians ceded a great portion of their territory, which pioneers began at once to settle. In 1799 the Territory of Ohio, which included Indiana, was organized, and Chillicothe was made the seat of government. In the following year Indiana was separated from it.

As a State. After Congress passed the enabling act in 1802 a convention adopted a state constitution. In 1803 Ohio was admitted into the Union, being the fourth state admitted after the original thirteen. The state took an active part in the War of 1812. In 1816 Columbus was made the capital. On account of its geographical situation and its great natural resources, the course of Western immigration set toward the state and built it up rapidly. Although there was a strong sentiment in favor of the Confederate cause, especially in the southern part of the state, Ohio supplied many times its quota of troops to the Federal army during the War of Secession. Many of the leading commanders of the Union army were natives of Ohio. The state has always played a prominent part in national politics. In Presidential elections Ohio has always voted Republican, except in 1912 and 1916, when Woodrow Wilson, Democrat, obtained the electoral vote. Ohio is the birthplace of six Presidents —Ulysses S. Grant, Rutherford B. Hayes, James A. Garfield, Benjamin Harrison, William McKinley and William H. Taft. O.B.

Other Items of Interest. It is estimated that there are within the state of Ohio almost 10,000 mounds left by the Mound Builders. Some of them are small, but others cover hundreds of acres.

The valley of the Hocking River is Ohio's greatest coal area, and "Hocking Valley" coal is known all over the United States.

On Kelley's Island is a great rock which is known as "Inscription Rock." For on it is carved in the picture-writing of the Erie Indians the story of the conquering of their tribe by the Iroquois.

In 1921 the general assembly passed an act to reform the administrative department, combining and consolidating offices.

The undulations, or upheavals, of the rocks under the surface of Ohio have been very slight, and its hills and rolling stretches have

been carved by streams or built up and dug out by glaciers.

The greatest percentage of increase in population in Ohio was during the decade between 1800 and 1810, when the growth was over 400 per cent; the greatest actual growth, however, was between 1900 and 1910, when there was an increase of 609,576.

Consult Black's *The Story of Ohio;* Randall and Ryan's *History of Ohio: The Rise and Progress of an American State.*

Related Subjects. The following articles in these volumes contain much that will be of interest in connection with a study of Ohio:

CITIES

Akron	Lima
Alliance	Lorain
Ashtabula	Mansfield
Barberton	Marietta
Bellaire	Marion
Bellefontaine	Martin's Ferry
Cambridge	Massillon
Canton	Middletown
Chillicothe	Mount Vernon
Cincinnati	Newark
Cleveland	New Philadelphia
Columbus	Norwood
Conneaut	Piqua
Coshocton	Portsmouth
Dayton	Salem
Delaware	Sandusky
East Liverpool	Springfield
Elyria	Steubenville
Findlay	Tiffin
Fostoria	Toledo
Fremont	Warren
Hamilton	Xenia
Ironton	Youngstown
Lakewood	Zanesville
Lancaster	

HISTORY

Northwest Territory	Ordinance of 1787

LEADING PRODUCTS

Apple	Petroleum
Coal	Potato
Corn	Pottery
Glass	Salt
Hay	Sheep
Iron	Steel
Lumber	Tobacco
Oats	Wheat
Onion	

RIVERS

Ohio	Scioto

OHIO COMPANY, the name given to two organizations which had as their purpose the planting of colonies in the Ohio River valley. The first, dating from 1749, included in its membership London merchants as well as wealthy Virginians, among them being Lawrence and Augustine Washington, brothers of George. It secured from George II a grant of 500,000 acres, which lay south of the Ohio River. Part of the land was surveyed, but no actual colonization was attempted, and later the members of the company either dropped out or transferred their interest to the Walpole Company, organized for a similar purpose.

The second of the two companies was the more important; it was specifically known as the *Ohio Company of Associates,* and was organized at Boston in 1786 by colonial officers and soldiers. General Rufus Putnam, Samuel H. Parsons and Manasseh Cutler were its most prominent members. The purchase of 5,000,000 acres of land along the north bank of the Ohio River was authorized by Congress, but the company actually purchased less than half that area. Late in 1787 a band of colonists set out from New England, and in April of the following year Marietta, the first town within the present state of Ohio, was founded. The Ohio Company, and especially Manasseh Cutler, were influential in deciding the contents of the Ordinance of 1787 and in thus prohibiting slavery in the Northwest Territory. See NORTHWEST TERRITORY; ORDINANCE OF 1787.

OHIO RIVER, one of the great rivers of the United States, which pours its waters into the Mississippi after traversing nearly 1,000 miles of the richest farming and industrial region of the country. The system of which it is the center drains an area variously estimated at from 202,400 to 214,000 square miles, and serves such thriving cities as Pittsburgh, Wheeling, Cincinnati, Evansville and Louisville. The channel of the river separates the Northern states of Ohio, Indiana and Illinois from the Southern states of Virginia and Kentucky.

Originally the bed of the Ohio was so obstructed by snags and shallow bars that commerce was interrupted during the dry months. The Federal government has now rendered the stream navigable during all of the year by removing the snags and introducing dikes and wicket dams. From its source, at the confluence of the Allegheny and the Monongahela at Pittsburgh, to its mouth at Cairo, the Ohio is the channel of a vast commerce, fed by such tributaries as the Miami, the Wabash, the Big Sandy, the Tennessee, the Green and the Cumberland. In pioneer days it was the chief avenue of approach to the new lands of the West, and was a most important factor in hastening the development of the whole region. It is still a competitor of the railroads in the carrying of trade.

The basin of the Ohio is subject at intervals to disastrous floods. The average rainfall in the region is about forty-three inches yearly. During the spring rains, when the swift mountain streams along its eastern course are in flood, the river often rises with appalling suddenness, submerging bottom lands and flooding low-lying cities along its banks. See FLOOD, for details of these visitations.

Consult Thwaites' *On the Storied Ohio;* Hulbert's *The Ohio River.*

OHIO STATE UNIVERSITY, an institution of higher education established by the state legislature at Columbus, O., in 1870. It was first called the Ohio Agricultural and Mechanical College and was opened in 1873. The institution was reorganized in 1878 as the Ohio State University, and at present consists of the departments of arts, philosophy and science, agriculture, engineering, education, medicine, homeopathic medicine, dentistry, law, pharmacy, veterinary medicine, and a graduate school. The Starling-Ohio Medical College, including a dental college, has been a part of the university since 1914. The affairs of the university are managed by a board of seven trustees whose appointments are made by the governor of the state and confirmed by the legislature. There are about 675 instructors and nearly 7,900 students. The university library contains 160,500 volumes. Of the 582 acres of land owned by the institution, all but 110 are devoted to work in agriculture and horticulture. There is a laboratory for summer research work at Sandusky.

OHM, *ome,* the unit of resistance to an electric current. It is the resistance offered by thirty feet of No. 25 copper wire at 32° F.; that is, the resistance of a wire about eighteen-thousandths of an inch in diameter at the freezing point of water. Every electrical conductor offers resistance to the flow of an electric current, just as a tube through which water flows offers resistance to the current by friction on its walls. Small tubes offer relatively greater resistance than large ones, so poor conductors offer greater resistance to the flow of the electric current than good conductors. See ELECTRICITY.

Ohm's Law. Experiment proves that if the resistance remains the same, the flow of an electric current will increase in proportion to the increase of the strength of the current. For example, if a current from a single dry cell flows at a given rate over a wire, and we increase the number of cells to four, the flow will be four times as great. Conversely, the flow will decrease in the same proportion as the source from which it is derived is weakened. Professor Ohm, a German physicist, who discovered this law, stated it as follows: *Current equals volts divided by ohms.*

Georg Simon Ohm (1787-1854), a German physicist who discovered and announced Ohm's Law in 1825. He was born in Erlangen, Bavaria. From 1817 until his death, July 7, 1854, he was successively professor of physics in the Jesuit College of Cologne, director of the Polytechnic School in Nuremberg and professor of physics in the University of Munich. For his discovery he received the Copley medal from the Royal Society of London.

OIL CITY, PA., the principal oil market of the petroleum fields of Pennsylvania, is a city in Venango County, in the northwestern part of the state, 135 miles northeast of Pittsburgh and about fifty-five miles southeast of Erie. The city occupies over three square miles of hilly ground along both banks of the Allegheny River, at the mouth of Oil Creek. Several steel bridges unite the three sections of the town. It is on the Pennsylvania, the Erie and the New York Central railroads and has interurban electric lines. The population, which in 1910 was 15,657, was 21,274 in 1920, a gain of 36 per cent.

Vast amounts of oil are shipped from the surrounding oil fields. Natural gas, also found in the vicinity, is used for heat and light and for power in manufacture. The industrial establishments include oil refineries, oil-well supply manufactories, engine, machine and boiler shops, and manufactories of spokes and handles, explosives, tubes and tanks. The city parks, including Hasson's Park of forty-eight acres, are supplemented by Monarch Park, a beautiful resort four miles distant. Prominent buildings include the Federal building, Y. M. C. A. building, state armory, Carnegie Library, sanatorium, city hospital, high school building and the offices of the Standard Oil Company.

Oil City was settled in 1825, but did not become important until the discovery of oil in 1859. It was incorporated as a borough in 1863 and became a city in 1874. The commission form of government was adopted in 1911. In the spring of 1892, Oil Creek, swollen by a cloud-burst, washed into the city a mass of burning oil which escaped from tanks which were probably struck by lightning. More than fifty lives were lost, and property valued at $1,000,000 was destroyed. G.W.L.

OILCLOTH, a heavy ornamental cloth, sometimes called floorcloth, used commonly to cover wood that requires frequent washing. Its foundation is a strong, coarse burlap, made of flax and hemp, which is stretched in a frame, brushed with a glue-size made of glue, rye flour, tobacco and varnish, then dried and rubbed with pumice stone. Two or three coats of thick, heavy paint are then applied, and each coat, when dry, is smoothed with pumice stone. After this process, the cloth is placed in a loom where the pattern is printed by blocks, as in calico printing, each color having a block.

Floor oilcloth is manufactured in many grades, and measures from three feet to twenty-four feet in width. It has largely been superseded by linoleum, as the latter contains a mixture of ground cork and oxidized linseed oil which makes it more durable. Lighter weights of oilcloth are used for tables, pantries and various household purposes. See LINOLEUM.

OILS, a class of substances composed chiefly of hydrogen and carbon, which in a liquid state flow slowly and adhere to most substances with which they come in contact. Oils are lighter than water, and will not dissolve in it, but they are soluble in alcohol and a few other substances. According to the sources from which they are obtained, oils are classified as *animal, vegetable* and *mineral;* according to their behavior on heating they are classified as *fixed* (or *fatty*) and *volatile.*

Fixed Oils. Fixed oils are of both animal and vegetable origin. Those obtained from animal tissue are extracted by pressing the tissue when cold, and by heat and pressure. Since a much larger quantity of oil is obtained by the use of heat, this method is usually employed. Among the most valuable fixed oils are those obtained from certain kinds of fish, as, menhaden, salmon, sardine, herring and sturgeon. These are sometimes known as *marine,* or *fish,* oils. The seeds of certain plants are also important sources of fixed oils. Chief among them are flaxseed, from which linseed oil is obtained; cotton seed, corn and sesame. The oil is obtained by grinding the seed and subjecting the product to great pressure either with or without heat. The oil obtained without heat is of better quality than that obtained by raising the crushed seed to a high temperature, and it is usually designated as *cold-pressed.* Castor oil used in medicine is a good example. Heat is usually employed in the extraction of vegetable as well as of animal fixed oils, because by its use larger quantities are obtained. Fixed oils are liquid fats and some of them are solid at ordinary temperatures. The fish oils, olive oil and linseed oil are good examples of those that are liquid at ordinary temperatures.

Drying Oils are those that absorb oxygen when exposed to the air and form an elastic solid substance when spread in thin coats. These oils are extensively used in making paints, the most important among them being linseed, hemp, walnut, poppy, candle-nut, sesame, sunflower and Chinese wood oils. *Non-drying* oils on exposure to the air ferment and become rancid. Olive, cottonseed and almond oils are good examples. *Semidrying* oils absorb oxygen from the air rapidly but do not harden. Oil-soaked rags sometimes absorb oxygen so rapidly that they take fire from the heat developed by the chemical action. Croton- and grape-seed oils are good examples of semi-drying oils. Fixed oils are lighter than water and will not dissolve in it. They dissolve readily in alcohol and ether, and those used in paints dissolve in turpentine.

Fixed oils are used for many purposes, such as food, making soap, dressing leather, making paints, lubricating machinery and for illumination. See FAT; LINSEED OIL; PAINT.

Volatile Oils. Volatile oils are those that evaporate rapidly on exposure to the air. They are obtained from plants, and are usually extracted by distilling the plant or some part of it with water. The more delicate oils, like the oil of rose, are often obtained by packing the flowers in such a fat as lard, which absorbs the oil. The fat is then heated and the oil separated from it by distillation. When dissolved in alcohol volatile oils form *essences.* They are extensively used in the manufacture of perfumery, and some of them, as peppermint, clove and wintergreen, are valuable in medicine. The oils of clove, rosemary, cinnamon, lemon, lime, orange and nutmeg are used in the arts. See PERFUME. C.H.H.

OJIBWA, *o jib'way,* one of the most peaceable tribes of the North American Indians, belonging to the Algonquian stock. Formerly they occupied large tracts of land about the upper Great Lakes, in Michigan, Minnesota, Ontario, Manitoba and neighboring regions, and now dwell upon reservations in the same districts. Their Indian name, *Chipwayanwok,* means *tailskins,* and was given them on account of their dress, which had points hanging

down before and behind. They are well-built people, tall and agile, and expert hunters and fishermen. They now number about 30,000, approximately 12,700 of whom live on Canadian reservations. See INDIANS, AMERICAN.

OKAPI, *o kah'pe,* a peculiarly-colored animal of the giraffe family, discovered in 1899 by exploring parties in the dense forests of the Congo valley, in Africa. It is about four feet tall at the shoulders and has a rather long neck, while its sloping body makes the forelegs look longer than the hind ones, as is true of the giraffe. Although the body is red-brown, the limbs are creamy-white, boldly marked with purple-black stripes and blotches. The innocent-looking face of the okapi is creamy-white, but the nose and pointed ears are deep brown or black. Little is known of the habits of the animal.

OKECHOBEE, *o ke cho'be,* the largest lake in the Southern states, located in the great Florida swamps known as the Everglades. It is forty miles long and over twenty-five miles wide, and is very shallow in most parts, never reaching a depth of more than twenty-two feet. Its shores are lined with marshy jungles and cypress swamps, while the lake is filled with weeds, so that it cannot be used for boating. The outlet into the Gulf of Mexico through the Caloosahatchee River has been improved by several drainage canals, which have also made a large portion of the surrounding country fit for agriculture. The great drainage project in the Everglades will in time change the entire character of the region. The plans are illustrated on page 2107.

OKHOTSK, *o kotsk',* SEA OF, an arm of the North Pacific Ocean, 1,000 miles long and 600 miles wide, navigated chiefly by whaling vessels. It is separated from Bering Sea on the east by the island of Kamchatka, and from the ocean on the south by the Kurile Islands. This sea is icebound from November to April, and sometimes longer. It receives the waters of the Amur and other smaller rivers, and its shores are steep and inhospitable. The towns of Nikolayevsk and Okhotsk are its chief ports. The former is a naval station, with a fair trade and about 7,000 population; the latter has about 400 inhabitants, having declined in commercial importance with the lessening of the whaling industry.

OKLAHO'MA, one of the western south-central states, formed by the uniting of Oklahoma and Indian territories, and the forty-sixth to enter the Union. In 1915 this state led all others for the first time in the production of petroleum, and owing to the rapid development of this and other industries, and of its cities and towns, Oklahoma is popularly known as the BOOMER STATE. Towns have been established almost in a day, as was Thomas in Custer County; the site of this place was chosen by persons who went into the territory on an excursion train, which they stopped when a favorable location for settlement was found. In a day the town was laid out and a daily paper was started. The name of the state is a Choctaw Indian word meaning *land of the red man.* The mistletoe, which grows on Oklahoma's great oaks, has been chosen as the state flower.

Size and Location. Having an area of 70,057 square miles, of which 643 square miles are water surface, Oklahoma is slightly larger than the state of Missouri, and three times the size of Nova Scotia. It is separated from Texas on the south by the Red River, a natural boundary. A narrow strip known as the *Panhandle,* thirty-five miles wide, formerly called *No Man's Land,* extends 120 miles west of the main part of the state on the northern border.

People. The population of Oklahoma has grown more rapidly than that of any other state of the Union. In 1910, when the state was only three years old, the inhabitants numbered 1,657,155, which was about equal to the population of the state of Louisiana. On January 1, 1920, the population was reported as 2,028,283, nearly ten times what it was twenty-five years before. The proportion of negro and Indian

inhabitants is decreasing as a result of the constant immigration of whites from other states. Among the whites of foreign birth, the Germans are most numerous. In 1920 Oklahoma had the largest number of Indians of any of the states; they totaled 55,949. Only about one-fourth of these are of full blood; a large proportion are one-half or more white, and the Creeks and some other tribes have some negro blood. The Kiowa and Comanche Indians are the only tribes native to the state. Less than two-fifths of the total population are church members. Of these the Methodists are most numerous, followed by the Baptists, in almost equal numbers; next in order are Roman Catholics, Disciples of Christ, Presbyterians and Episcopalians, ranking in the order named.

Three years after the state was admitted to the Union there were eight cities having over 10,000 inhabitants; namely, Oklahoma City, the capital; Muskogee, Tulsa, Enid, McAlester, Shawnee, Guthrie and Chickasha.

Education. Oklahoma's educational system is administered by a superintendent of public instruction and a state board of education. Public education is supported by taxation and a state school fund. Industrial subjects, including agriculture, stock raising and domestic science, are taught in the public schools. There are high schools in all counties having 6,000 or more inhabitants and in all towns and cities. Separate schools with equal advantages are maintained for the negroes. The education of the Indians, which was formerly in the hands of the civilized tribes and missionaries, is now included in the state system. There are a number of academic institutions for Indians which give preparation for the Eastern colleges. There is a compulsory education law, and about four-fifths of the total population of school age is enroled in schools. The illiteracy, averaging 5.6 per cent, is less than that of any of the southern or other south-central states.

The state maintains normal schools at Edmond, Alva, Weatherford, Ada, Tahlequah and Durant, and many institutions of higher education, including the state university at Norman; a school of mines and metallurgy at Wilburton; a woman's college at Chickasha; an agricultural and normal university for the colored at Langston; Kingfisher College at Kingfisher, and Henry Kendall College at Tulsa. The state board of agriculture controls the agricultural

ADMINISTRATION BUILDING, STATE UNIVERSITY

and mechanical college at Stillwater, and the district agricultural colleges at Goodwell, Broken Arrow, Tishomingo, Warner, Helena and Lawton. The Methodist University at Guthrie and the Christian University at Enid are the most prominent denominational schools of the state.

There is a state department for the administration of institutions of charity and correction. These include a state home at Pryor; schools for the blind at Muskogee and Fort Gibson; an institution for the feeble-minded at Enid; a school for the deaf at Sulphur; a sanitarium at Norman; an industrial school for the colored deaf, blind and orphaned and a Confederate soldiers' home at Ardmore; a reformatory at Granité; the penitentiary at McAlester. Among the unusual powers of the commissioner of charities and corrections is the authority to appear before probate courts in behalf of minors, orphans, defectives and dependents in public institutions. The department also has a public defender who appears in cases for orphans and minors.

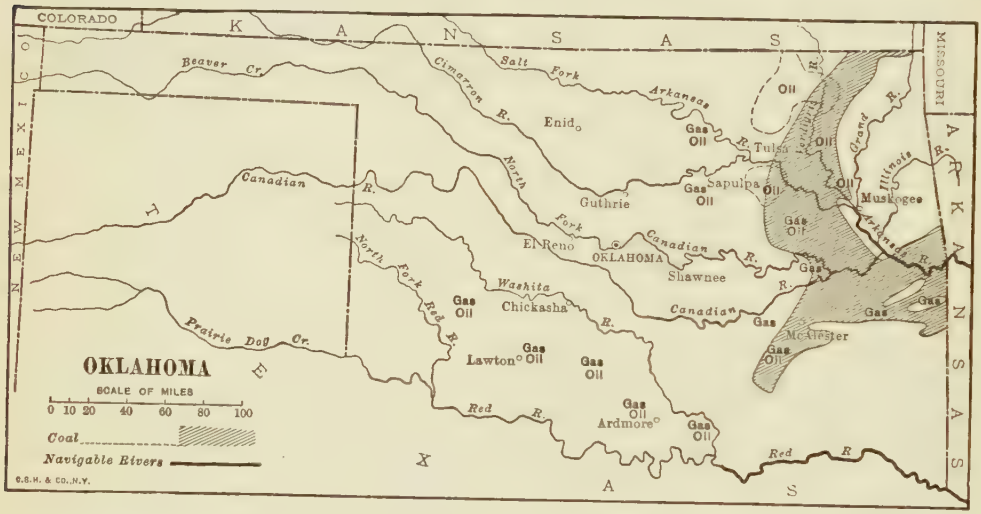
Physical Features and Resources

The Land. Oklahoma is a vast, elevated plain, tilted toward the south and southeast and broken by low mountains. The Ozarks of southwestern Missouri extend into the northeast section of the state, forming a wooded table-land, carved by the deep valleys of streams but having no high peaks. Along the eastern border, long, narrow, heavily-timbered ridges rise from the prairies. The Arbuckle Mountains, a region of beautiful woods and streams, rises 600 or 700 feet above the surrounding country in the south-central part of the state, and the Chautauqua Mountains break the monotony of the grassy plains in the west-central section. The Wichita Mountains, a straggling range of rough granite peaks, rise abruptly from

the level plain in the southwest corner of the state.

With the exception of such isolated clusters of mountains, most of the southern part of the state is a treeless plain, where the rank grasses toss in the white glare of the cloudless sky. It is carved by the canyons of streams and dotted with buttes and mesas. In the northwest there are four large salt plains coated with dazzling white salt crystals and containing many salt springs. *No Man's Land* is a high, rough tableland, lying at the foot of the Rocky Mountains. The lowest part of the state is in the Red River Valley, which is a gently-rolling timberland few salty ponds, which evaporate during the dry season.

Climate. Oklahoma has the dry climate of the Western states and the warm temperature of the South. Owing to higher elevation and greater distance from the Gulf coast, the western and central portions of the state are cooler and dryer than the eastern and southern sections. The annual temperature averages 62° F. in the northwestern plateau. At Oklahoma City, in the center of the state, the temperature averages 38° F. in the winter and 78° F. in the summer. The rainfall varies from twenty inches in the west to forty-five inches in the



OUTLINE MAP OF OKLAHOMA

Showing the boundaries, chief cities, principal rivers, location of coal measures, and the main gas and oil fields.

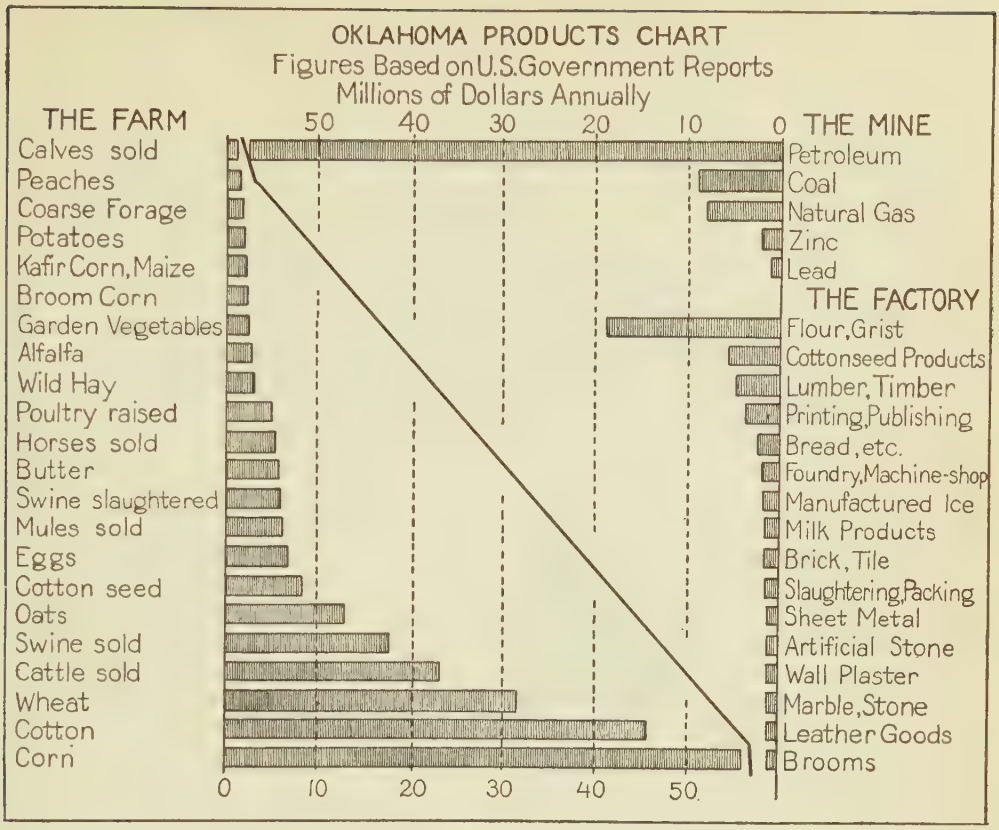
and fertile agricultural region, 600 feet above the sea.

Rivers and Lakes. There are numerous rivers and streams in Oklahoma, but none is used for navigation. The Red River, forming the entire southern boundary, and its tributaries, the Kiamichi, Washita and Fork of the Red River, drain all of the southern portion of the state. Between the Ozarks and Arbuckle Mountains are the broad, fertile valleys of the Arkansas, Canadian, Neosho or Grand rivers. The Arkansas, crossing the northeastern part of the state, is the main waterway and is fed by the Canadian, Cimarron, Neosho, or Grand, Verdigris, Illinois and many smaller streams. The Canadian, the largest tributary, rising in New Mexico, flows east across Oklahoma, joining the main stream near the state's eastern border. There are no permanent lakes and only a

east, and, except in *No Man's Land* in the extreme northwest, it is nowhere too scant for agriculture. Snow rarely falls in the southern part of the state. The lack of humidity makes the climate healthful and less enervating than that of the other states in this region.

Agriculture. Before the opening of Oklahoma to white men in 1889, much of the territory was occupied by great herds of cattle driven in from Texas. The prairies, with more than one hundred varieties of native grass, furnishing excellent pasture and abundant feed, have made Oklahoma one of the leading cattle states of the Union. The value of the live stock of the state in 1921 was estimated at $195,000,000.

Agricultural development has been remarkably rapid, and many of the ranges have been divided into smaller farms. Over one-half of



the state area is farm land, about two-thirds of which is improved. The Indians still own many of the large ranches, which are leased to white men. In the middle and eastern sections the soil is very fertile, and large crops of wheat, cotton and corn are raised. In the acreage of cotton Oklahoma now ranks sixth among the states, and holds the same place in the amount of cotton produced. The annual output of cotton now exceeds $45,000,000, and the annual corn product is valued at $56,000,000. Potatoes, two crops of which may be grown on the same ground in a year, hay and forage (chiefly alfalfa), sweet potatoes and other vegetables, sorghum cane, tobacco, flowers and nursery products are also important. Oklahoma produces large quantities of apples, peaches and other orchard fruits, grapes and watermelons. The state ranks sixteenth in crop values.

About one-half of the Panhandle in the west is irrigated, and government projects include an additional 100,000 acres under the Cimarron system in Beaver and Woodward counties and under the Red River project in Kiowa and Comanche counties.

Forests. The western part of the state is almost bare of trees, but in the eastern section the woodlands cover about 12,500 square miles. Yellow pine, the chief softwood, is the most important timber of the state, and oak is the principal hard wood. There are large groves of walnut in the lower valleys, and much red cedar, which is principally used for fuel, grows in the south. During the last decade the forest products have increased to three times their former value.

Minerals. Oklahoma ranks seventh among the mineral states of the Union, and petroleum is its chief product. The development of the great oil resources of the state has been remarkable since 1904, when the production was greatly increased by drillings in the Osage Indian reservation. One of the wells in the famous Glen Pool near Sapulpa has a flow of 1,000 barrels a day. In 1915 occurred the almost incredible production of the Cushing oil field in Creek County, where the pool produced at the rate of 6,250,000 barrels a month, more than ever was produced during a similar period by any of the greatest wells in Russia, the United

States or Mexico. However, towards the end of the year, the flow decreased.

The attention given to the petroleum interests has somewhat retarded the recent development of coal, which ranks second in importance among the minerals of the state. The coal fields extend from Kansas to Arkansas, and have an area of about 20,000 square miles. Most of the coal is now obtained in Pittsburg, Coal, Okmulgee and Latimer counties. In the production of natural gas, Oklahoma is one of the leading states, and the production since 1910, when the state ranked fifth, has greatly increased. Lead and zinc are mined in Ottawa County, in the northeast, which is a part of the lead and zinc region of southwestern Missouri. Clay products, principally common brick, limestone, asphalt, gypsum, lime, cement rock, pyrite, salt, sand, gravel and commercial mineral waters are other minerals of importance, and granite, copper, iron, gold and silver are found in small quantities.

Manufactures. The great development of the oil and coal as fuel resources and the abundance of agricultural and mineral products have caused an increase in manufacturing industries. First in importance is the production of flourmill and gristmill products; this is followed by the refining of oil, the manufacture of cottonseed oil and cake, lumber and timber products, and printing and publishing. Oklahoma City, Enid, Muskogee and Guthrie are the centers of the flour milling and printing and publishing industries. Steam railroad car repairs and foundry and machine-shop work are also important. Oklahoma in 1920 had 2,446 factories, capitalized at $280,847,000. The value of the products that year of high prices was $402,462,000.

Transportation. The state is well supplied with railroad transportation facilities, for it is traversed by trunk lines from east to west, north to south and northeast to southwest. In 1914 there were 6,357 miles of railroad in the state, not including the short spurs. All important towns are on one or more lines, and there are wagon roads between railroad stations and small settlements. Oklahoma City, Tulsa, Muskogee, McAlester, Guthrie, Chickasha and Enid are the railroad centers. The principal lines in the state are the Chicago, Rock Island & Pacific; the Saint Louis & San Francisco; the Atchison, Topeka & Santa Fe; the Missouri,

RESEARCH QUESTIONS ON OKLAHOMA

(An Outline suitable for Oklahoma will be found with the article "State.")

What and where is "No Man's Land," and why was it given that name? What else is it called, and why?

About what is the area of No Man's Land?

What does the name *Oklahoma* mean? Why is it more appropriate to this state than it would be to any other?

How does the loftiest elevation in this state compare with that in each state upon which Oklahoma borders?

What is the popular name of the state, and what characteristic of the life and history of the region does it apply to?

What town had a newspaper on the very first day of its existence?

To what type of plant does the chosen "flower" of this state belong?

How many states of the Union have a greater area than Oklahoma? How many of these lie farther to the east?

What was the percentage of increase in population in this region between 1890 and 1915? Between 1910 and 1915?

Of the Indian tribes resident in the state, how many are native to it?

What does the educational system do to help the farmer?

What is a butte? What is a *mesa?* How were most of them formed?

Describe the four curious "plains" in the northwestern part of the state.

What is the most agreeable and favorable feature of the climate?

How many states have come into the Union since Oklahoma was admitted?

Describe the "rush" that took place when a part of this region was opened up to white men for settlement.

Why have agricultural conditions in the Panhandle been different from those existing elsewhere in the state?

To what branch of agriculture has the state always been especially well fitted, and why?

From the statistics given in this article, show that there is one state which produces more cotton to the acre than does Oklahoma.

Which is of greater value, the total wheat product or the total cotton product?

In the output of what mineral product has Oklahoma in recent years ranked first?

How many barrels of petroleum does the Glen Pool pour out in a year?

What was the record-making flow of the Cushing Oil Field?

How has the exploitation of the oil fields interfered with the production of another fuel?

What two states have a combined area about equal to the area of Oklahoma's coal fields? (See list of states in article UNITED STATES.)

What is the railroad mileage of the state to each hundred square miles of area? How does it compare in this respect with the states upon which it borders?

How many state constitutions has Oklahoma had?

What is the difference between Oklahoma's prohibition law and most other prohibition laws?

How did this region come into the possession of the United States?

When did the United States purchase valuable land for fifteen cents an acre?

How many of the boundaries of this state are "natural" boundaries—either rivers or mountains?

Kansas & Texas; the Wichita Falls & Northwestern; the Missouri, Oklahoma & Gulf; the Midland Valley; the Fort Smith & Western; the Missouri Pacific; the Kansas City, Mexico & Orient; the Kansas City Southern, and the Oklahoma Central. There are 71,325 miles of public roads, only 500 miles of which are yet paved. The control of railways and other public-service corporations is vested in a board of three commissioners, whose decisions may be appealed only to the supreme court of the state of Oklahoma.

Government and History

Government. The present constitution, which was adopted when Oklahoma was admitted to the Union, contains many provisions which in other states are subjects of amendments and purely legislative enactments. Amendments may originate in either house of the legislature or among the people; but must be adopted by a majority in both houses and by the voters. Constitutional conventions may be held only with the approval of the people on a referendum vote. All male citizens, including those of native Indian descent who have resided in the state one year, in the county six months and in the precinct thirty days, may vote, providing they can read and write the Constitution in English. Women may vote in school elections. In the election of state senators, voters may express first and second choice.

The legislature, which meets biennially, consists of a senate of not more than forty-four members, elected for four years, and a house of representatives of not more than 109 members, elected for two years. In 1915 there were forty-four senators and ninety-nine representatives. The initiative and referendum are in effect.

The executive power is vested in the governor, lieutenant-governor, secretary of state, attorney-general, treasurer, superintendent of public instruction, commissioners of labor, charities and corrections and insurance, mine inspector and state examiner, all of whom are elected for terms of four years. The governor, secretary of state, auditor and treasurer are not eligible to immediate reëlection.

The judicial department consists of a supreme court, district, county and municipal courts and justices of the peace. The supreme court consists of a chief justice and four judges, elected for six years. The state is divided into twenty-one judicial districts, each having a judge, elected for four years; county judges are elected for terms of two years. There are justices of the peace in each county and two in each city of over 2,500 inhabitants.

Each county is organized into a corporate body under three county commissioners. Cities of 2,000 or more inhabitants may frame their own governments and may exercise the initiative and referendum. The manufacture and sale of liquors is forbidden until 1928, when the question will come before the voters, unless forestalled by national prohibition. Child-labor laws, mothers' pensions and workmen's compensation acts have been passed.

History of the Indian Country. Oklahoma was probably first explored by the Spanish in the sixteenth century. The territory was included in the Louisiana Purchase, and was set apart by the United States in 1834 as an unorganized territory for the use of the "Five Civilized Tribes," the Cherokees, Creeks, Seminoles, Choctaws and Chickasaws. These tribes established governments on civilized models, having legislative councils, governors, courts and schools. In 1866 the Creek Indians ceded part of their domain in Indian Territory to the United States for thirty cents per acre and the Seminoles sold their entire holdings at half that price per acre.

White men were forbidden by law to settle within the Indian domains, and great tracts of this region for a long time remained unoccupied. In 1880 it was necessary to use troops to dislodge settlers who had crept into the territory. On April 22, 1889, the vacant lands were declared open for settlement. The expectant pioneers had to be kept back by troops until the hour of the opening of the lands, and then a mad race for the best farms and town sites followed. There was a great movement of settlers from Texas, Arizona, Missouri and Kansas, and additional lands were opened. Towns and cities were "boomed," and the foundations of the large industries of the state were soon established.

As an Organized Territory and State. From the western half of the unorganized Indian lands, the Territory of Oklahoma was created March 2, 1890, and agitation for statehood soon followed. In 1891 its admission as a state was defeated in the Federal Senate. Finally, in 1906, provision was made for the admission of Oklahoma and Indian Territory as one state,

if approved in each territory. This union was approved, and a constitution, probably more radical than any adopted elsewhere in the United States, was framed by delegates from both territories and adopted by the people. President Roosevelt objected to some of its clauses, and other statesmen strongly advised the rejection of the constitution, but the people adopted it by a large majority on September 17, 1907. A Democratic governor was elected, and a prohibition amendment was added. In 1910 the "grandfather's clause," restricting the negro vote by property and educational tests, was passed, but in 1915 this was declared unconstitutional by the United States Supreme Court. The capital was removed from Guthrie to Oklahoma City in 1911. The state has been strongly Democratic; all governors have been Democrats, and in all of the Presidential elections, including that of 1916, held since the admission of the state, the Democratic candidates received the plurality of votes. E.B.P.

Other Items of Interest. The "Panhandle" is a strip of land about thirty-five miles wide and 120 miles long. It originally belonged to Texas, but when Texas was admitted to the Union as a slave state it was compelled to give up that part of its territory north of latitude 36° 30′. This region was a part of no state or territory and had no established law, and it was this fact which won it its name of *No Man's Land*. It became the resort of outlaws, and not until 1890 was it made a part of Oklahoma and brought under Federal law.

Prairie wolves, black bears, foxes, deer and other wild animals are still to be found in the unsettled region of this state, but they are fast being exterminated.

Many Indians of the Five Civilized Tribes had become so prosperous in the years before the War of Secession that they held large numbers of slaves. These slave-holding Indians were active in support of the Confederacy, and at the close of the war were compelled not only to free their slaves, but to make new treaties with the United States.

It is estimated that when, in 1889, the rich lands of this region were opened up to settlement by the whites, there were no fewer than 20,000 people waiting to cross the line when the signal was given.

The greatest elevation in Oklahoma is found in the extreme northwest, in the Panhandle, where the land is about 4,700 feet above sea level.

Consult Cantonwina's *Star Forty-six, Oklahoma;* Roberts' *Essential Facts of Oklahoma History and Civics;* Abbott's *History and Civics of Oklahoma.*

Related Subjects. The reader who is interested in Oklahoma will find much that is helpful in the following articles:

CITIES AND TOWNS

Ardmore
Chickasha
Enid
Guthrie
McAlester
Muskogee
Oklahoma City
Sapulpa
Shawnee
Tulsa

HISTORY

Cherokee
Chickasaw
Choctaw
Creeks
Five Civilized Tribes
Grandfather's Clause, The
Indians, American
Public Defender
Seminole

LEADING PRODUCTS

Alfalfa
Cattle
Coal
Cotton
Petroleum
Wheat

PHYSICAL FEATURES

Arkansas
Butte
Canadian River
Mesa
Red River

OKLAHOMA, UNIVERSITY OF, established at Norman in 1892, by act of the territorial legislature. The university consists of the college of arts and sciences, the college of engineering, schools of fine arts, medicine, pharmacy, law, nursing, journalism, education, business, social service, graduate work, and an extension division. The state departments of geology and natural history have their headquarters at the university. Students residing in Oklahoma are admitted without payment of tuition. The university has shown remarkable development since the admission of Oklahoma as a state. Here are over 4,100 students, and the faculty numbers over 175. The library contains more than 22,000 volumes. See OKLAHOMA, subhead *Education,* for illustration

OKLAHOMA CITY, OKLA., the capital and the largest city of the state, and the county seat of Oklahoma County. Its population was 64,205 in 1910; in 1920 it was 91,258 (42 per cent gain. The city occupies eighteen square miles of valley and upland, and is centrally located in the state, thirty-three miles south of Guthrie and 210 miles northeast of Fort Worth, Tex. It is on the north fork of the Canadian River and is served by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Frisco and the Missouri, Kansas & Texas railroads. Interurban lines operate south to Norman, the seat of the state university, and north to Edmond.

Oklahoma City has a number of attractive parks, with a combined area of nearly 1,400 acres. A boulevard thirty miles in extent encircles the city. Among the more prominent buildings are the state Capitol, a Federal building, a Carnegie Library and a fine high school building which cost $500,000. Here are the university medical school, Epworth University and several private schools.

Oklahoma City is an important jobbing center for a large agricultural and stock-growing country. The principal trade is in cotton, grain, live stock and fruit. Rich oil fields are being developed in the vicinity. The industrial establishments of the city include extensive meat-packing plants whose annual output is valued at $40,000,000, cottonseed oil mills and cotton compresses, flour mills and feedmills, oil refineries, poultry- and egg-packing plants, cracker and soap factories, and printing and publishing houses.

When, in 1889, the district about Oklahoma City was declared open for settlement (see OKLAHOMA, subtitle *Government and History*), a village was at once established on its site. This was incorporated two years later as a city, and in 1911 it became the state capital. The commission form of government, providing for five commissioners, was adopted by the state in 1912. E.E.B.

O'KRA, a plant cultivated chiefly for its green pods, which are used to thicken and flavor soup. The okra is a species of hibiscus (which see), and is a native of the West Indies. In the southern part of the United States, where it grows abundantly, it is known variously as *okra, gumbo, gombo, gobbo* and *ochro*. The plant is an annual and grows to a height of from three to five feet, bearing rounded, fine-lobed leaves and greenish-yellow flowers. The pods, which grow three or four inches long, are generally used when they are young and tender, and may be eaten as a vegetable as well as in soup. To insure good results the seed should be planted about the middle of May, and the young plants be kept free from weeds.

OLD AGE PENSIONS, regular payments to assist men and women of advanced age in order that they need not be dependent upon relatives or upon charity or pass their declining years in almshouses. The plan exists in a number of countries and in many forms.

The Compulsory System. Germany was the first country to adopt a national pension. In 1854 miners were compelled by law to insure, and since 1891 each workman whose annual wage does not exceed 2,000 marks (about $476) has been obliged to set aside an amount ranging from four to twelve cents a week, according to his earnings. His employer must add an equal sum, and after he reaches the age of seventy he receives a yearly pension of from 110 to 230 marks ($26 to $55), of which the government contributes fifty marks. Since 1911 teachers, musicians, actors and salaried workers who receive less than 5,000 marks must insure; their employers help, but the government does not. A salaried man pays from twenty cents to over three dollars a month, and his pension, which begins when he is sixty-five, may reach nearly $600. Austria established in 1906 a similar system for workers receiving salary; France, in 1910, for all workers; and Sweden, in 1913, for the entire population.

Voluntary Contributing. Belgium, by its laws of 1890 and later, adds liberally to the savings of its citizens. The older they are, the more encouragement they are given to provide for a pension. Italy has followed the same policy since 1898.

Canadian Government Annuities resemble in principle the Belgian and Italian systems, but the only contribution of the government is the expense of maintenance of the insurance system. At first there was a greater contribution than at a later date, because the four per cent interest which the government pays was higher than the current rate of interest. When the scheme was first inaugurated in 1908 a campaign of advertising lectures drew a few thousand depositors, most of whom desired annuities of less than $150. More recently the system has been less popular. The advantages claimed for the government annuities over the policies of private companies, known colloquially as "Yankee annuities," are that they cannot be seized for debt and that they are not forfeited if payments cease.

Free Pensions. Nearly all the nations grant pensions to government employees in their old age, and in the United States many corporations pension those who have served them long and faithfully. In a few countries this principle is extended to all citizens. Denmark gives an allowance to any man or women who at the age of sixty has an insufficient income but has not within the previous ten years received help, has never been a criminal nor shirked work. Each community bears half the cost of its pensions, the nation the other half.

Few citizens receive more than $50 a year. England, since 1909, grants five shillings ($1.25) a week, or less, to those over seventy; Australia, since 1909, and New Zealand, since 1898, pay twice as much to all over sixty-five.

Theories. It is claimed for the old age pension that it gives greater national efficiency by relieving the younger generation of the care of their parents. Canada, in adopting the voluntary system, did so because of the belief that both the compulsory and the free pension system discourage thrift. On the other hand, it is plain that the Canadian annuities benefit very few people. There are of course opponents to all these views, but it does not seem possible for either side to prove its case. Objectors in the United States lay emphasis on the huge cost of free pensions, but to maintain the Australian or New Zealand system would require less money than the present War of Secession pensions consume. C.H.H.

OLDENBURG, *ohl'den boorK,* until 1918 a grand duchy of Germany, tenth in rank among its states. It has a total area of 2,479 square miles and includes the duchy of Oldenburg,

LOCATION MAP

Though small, it is an important part of the country.

which comprises four-fifths of the entire area and population; and the two principalities of Lübeck and Birkenfeld. The combined area of these principalities is little more than 500 square miles. It is now a part of the new republic. The duchy of Oldenburg, which is a part of the plain of Northwestern Germany lying between the Weser and the Ems, consists of low, marshy coast lands along the North Sea, and an inland sandy region containing extensive heaths and moors. The soil of the marsh lands is very fertile, producing wheat, oats, rye, hemp and rape, and it also affords pasturage for superior breeds of cattle and horses. On the inland soil crops of rye, oats, potatoes and buckwheat are raised, and large numbers of sheep graze upon the moors. The chief articles of manufacture are woolen and cotton goods, hosiery, jute and cigars.

The principality of Lübeck, which lies within East Holstein, is bordered on the east by the Bay of Lübeck, an arm of the Baltic Sea. It is dotted with small lakes and has much delightful scenery. About three-fourths of the principality is under cultivation. Birkenfeld, which lies 150 miles south of the duchy of Oldenburg, is situated in the Prussian province of the Rhine. The grand duchy sent three deputies to the Reichstag (lower house of the German Parliament) and was represented by one member in the Bundesrat (upper house). The capital of the division is Oldenburg. Population of the state in 1919, 250,623.

OLD FORGE, Pa., a borough in Lackawanna County, in the northeastern part of the state, between Scranton and Wilkes-Barre, five miles from the former and fourteen miles from the latter, on an interurban line between those two cities. It is on the Lackawanna River and on the Delaware, Lackawanna & Western and the New York, Susquehanna & Western railroads. The chief industries are the mining and shipping of coal and the manufacture of silk; 5,000 men and boys are employed by the mines in the vicinity. Glass blowing is an important industry, and chemical and fertilizer factories are among the industrial establishments. Old Forge was settled in 1830 and was incorporated in 1899. It is four square miles in area. It had a population of 11,324 in 1910, which had increased to 12,237 in 1920 (8 per cent gain). Among the inhabitants are Italians, Poles, Slavs and Russians. M.M.

OLDHAM, *old'am,* a town in Lancashire, England, seven miles northeast of Manchester, in the center of the textile industry. It was once known as the ugliest city in Great Britain, but now presents an entirely different aspect; even the children have taken a personal interest in helping to beautify it. Oldham has about 300 mills, with more than 12,000,000 spindles, which consume one-fifth of the total imports of cotton from abroad, and huge weaving-machine works which give employment to most of the workers. The children were taught to grow flowers, to plant trees and to keep their yards as well as the streets clean. Each one took personal pride in helping to give the city a reputation for cleanliness and beauty. Then

all began to view with more interest their proprietorship in their town hall, their lyceum, their school of science and art, and especially their Alexandra Park covering seventy-two acres. Population, 1921, 145,001.

OLD IRONSIDES. See CONSTITUTION, THE.

OLD POINT COMFORT, VA., a popular seaside village, situated on a small peninsula at the mouth of the James River, about fourteen miles north of Norfolk. It lies at the point where Hampton Roads and Chesapeake Bay join the Atlantic Ocean—a site of unusual beauty. Excellent facilities for bathing, fishing and boating, an equable climate and beautiful scenery combine to make it an attractive resort. Fort Monroe is in the vicinity and adds to the attractions of the village. It was almost completely destroyed by fire in 1862, but was rebuilt after the War of Secession. Transportation is provided by the New York, Philadelphia & Norfolk and the Chesapeake & Ohio railways, and by steamers.

OLD RED SANDSTONE, an extensive system of rocks found in Scotland and Wales, formed during the Devonian Period, for which reason they are now called the Devonian system. The red sandstone is the most extensive and from this the system was named. In some places the system is from 16,000 to 20,000 feet thick. The rocks contain many fossils and are of great interest to geologists. Years ago the system was made famous by the geologist Hugh Miller, in his books *The Old Red Sandstone* and *Footprints of the Creator.* See DEVONIAN PERIOD.

OLD SOUTH MEETING-HOUSE. See page 847.

OLEAN, *o le an',* N. Y., the county seat of Cattaraugus County, situated in the western part of the state, five miles north of the Pennsylvania state line and seventy-one miles southeast of Buffalo. It is on the Allegheny River and on the Erie, the Pennsylvania and the Pittsburgh, Shawmut & Northern railroads. The population was 14,743 in 1910; it had increased to 20,506 in 1920, a gain of 40 per cent. The area exceeds five square miles.

Olean has several attractive parks, a Federal building which cost $75,000, a Carnegie Library, a Y. M. C. A. building, a state armory and Higgins Memorial Hospital. On the fair grounds race track some noted races have been run. Industrially, Olean is chiefly notable for oil-storage tanks which have a capacity of 10,000,000 barrels. Several pipe lines from the Pennsylvania fields terminate here. Other prominent industrial establishments include oil refineries, the Pennsylvania railroad shops, which employ 1,000 men, tanneries, machine shops and manufactories of glass, cutlery, wagons and pipes. Olean was settled in 1804 and became a city in 1893. M.E.B.

OLEANDER, *o le an'der,* a flowering evergreen shrub, widely known as a winter house plant and an outdoor ornament in summer. It grows to a height of eight or ten feet. The leaves are lance-shaped and leathery, and they grow opposite each other on the stem. The flowers are roselike and showy, usually of a beautiful red hue, but sometimes white or streaked in color. One species bears blossoms which are sweetly fragrant. An objection to the oleander is that all parts of the plant are poisonous. The native home of the oleander is in Western Asia, where its showy blossoms brighten the landscape. It is easily raised from cuttings, which if placed in bottles of water will form roots in a few weeks. They must then be transplanted to moist, rich soil.

OLEOMARGARINE, *o le o mahr' ga reen,* a manufactured substitute for butter. The essential ingredients are neutral lard (pure, refined lard of good quality, from which practically all of the free acid has been separated), beef fat of various kinds (from which oleo oil is obtained), and vegetable oils, such as cottonseed or palm oil. In addition, annatto, yellow coal tar dye or other coloring matters are added to give the product the appearance of genuine butter. It is also customary to treat oleomargarine with a small amount of butter or to churn it in milk or cream or both, in order to impart to it the real butter flavor.

A good grade of this substitute compares favorably with high grade butter in nutritive value, taste and purity, and it is difficult at sight to distinguish between the two. A simple boiling test will enable one to identify them. Place a small quantity in a tablespoon and hold it over a gas jet or over a lamp chimney. Let it come to a boil, stirring thoroughly two or three times during the boiling. If the sample is oleomargarine it will boil noisily and sputter, but show little or no foam; genuine butter, on the other hand, will boil with much less noise and produce a great deal of foam.

In order to prevent the marketing of oleomargarine as genuine butter, the United States government levies a tax of ten cents on every pound which is artificially colored to look like butter, and a tax of one-fourth of a cent a pound on the product when not so colored.

Oleomargarine imported from foreign countries is taxed fifteen cents a pound. The justice of this taxation is open to question, as good oleomargarine is not at all objectionable and should be accessible at a low price to families of small income. The advisability of revising the present law is being urged by the Bureau of Internal Revenue, in whose jurisdiction the enforcement of the law is placed. In normal years a considerable quantity of oleomargarine is exported to the West Indies; European countries, especially Holland, import from the United States large amounts of oleo oil. The annual production of oleomargarine is over 140,000,000 pounds, in the United States alone.

The name *butterine,* formerly applied to an especially high quality of oleomargarine, has no longer any particular significance, and is not used in the text of laws regulating the sale of substitutes for butter. See BUTTER; ADULTERATION OF FOODSTUFFS AND CLOTHING.

OLIGARCHY, *ol'i gar ki,* a form of government in which the ruling power is vested in a few persons, self-appointed. The word originated in ancient Greece, where most of the cities had this form of government between the time of the patriarchal kings of the *Odyssey* and *Iliad* and the rise of the tyrants. Oligarchy is the opposite of a pure democracy, where all citizens have a direct share in the government, and differs also from a republican form of government, in which the people elect officers to represent them in the councils of the nation. Those who favor an oligarchical form of rule believe that it works for the best interests of the state to have a selected group of the most enlightened citizens control affairs. In actual practice, however, oligarchies have always given the ruling class the opportunity to further their own interests. Oligarchies exist to-day in some states nominally republics or monarchies, but they never endure against the spread of popular education. An example of oligarchical rule of the better sort is the government established in England by Oliver Cromwell. See ARISTOCRACY.

OLIPHANT, *ol'i fant,* LAWRENCE (1829-1888), an English writer and traveler, born at Cape Town, South Africa. In his youth he traveled extensively with his parents, lived for some time in Ceylon, and on his return to England was called to the bar. He visited the scene of almost every war of importance between 1853 and 1861. Thus he spent considerable time at Sebastopol, with Garibaldi in Italy, and even in Japan.

In 1865 he was elected to Parliament, but two years later, having come under the influence of T. L. Harris, a mystic who had founded a brotherhood at Brocton, N. Y., he took up his residence in the community; and for fifteen years he and his mother and later his wife were virtually the slaves of Harris. After breaking with the latter, Oliphant lived for a time in Palestine, but later returned to London. He was eccentric and visionary, but a man of real genius. His works include *The Russian Shores of the Black Sea,* the novel *Piccadilly, Haifa,* or *Life in Modern Palestine* and *Episodes in a Life of Adventure.*

OLIPHANT, MRS. MARGARET (1828-1897), an English author, born at Wallyford, Scotland. In 1852 she married her cousin, Francis Oliphant, an artist, who lived but seven years after the marriage. Left with three children to support, she at once began to devote herself diligently to novel writing, and during the remainder of her life was a most industrious and careful worker. Her works are notably uniform in quality, and their humor and sympathetic character-painting give them high rank, though they cannot be counted among the really great English novels. They include *The Chronicles of Carlingford,* composed of *The Rector and the Doctor's Family* and *Salem Chapel; Harry Joscelyn; A Little Pilgrim in the Unseen,* and numerous others. She also wrote *The Makers of Florence, The Reign of Queen Anne, The Makers of Modern Rome, The Literary History of England from 1790 to 1825,* and other critical and historical works.

OL'IVE, one of the oldest of fruit trees and one of great economical importance. It was an olive leaf which Noah's dove brought back to the Ark (*Genesis* VIII, 11), and it is thought that Palestine or possibly Greece is the native home of the olive. It has been introduced into many other tropical and semitropical countries. Large olive orchards are found in California, and the trees are raised in other warm sections of the United States. Italy raises more olives than any other land, and they are grown in Algeria, France, Asia Minor and Spain, the latter country having been called by poets "the land of the vine and olive."

Description. The olive tree is a hardy, long-lived tree, said to attain the age of 1,000 years. It is low-branched, and the usual height is between twenty and thirty feet. The leaves are evergreen and lance-shaped, dusky green above and whitish beneath. The flowers are fragrant and of a yellowish-white hue. The entire tree

has a somber appearance, described by Elizabeth Barrett Browning in the following lines in her poem, *An Island:*

> . . . wan, grey olive-woods, which seem
> The fittest foliage for a dream.

The fruits vary in size from an acorn to a plum, are oval in shape, and contain a hard, two-celled stone. When ripe the fruit is black. Olive trees are slow of growth; they do not come into profitable bearing until the seventh year, and into full bearing until about thirty years of age. They are very fruitful, however, and an olive branch is a symbol of peace and plenty. Olive wood, which is yellowish, beautifully streaked with dark lines, takes an excellent polish and is used in the manufacture of many small fancy articles.

Olive Culture. Olives are usually raised from tips, and often from layers, suckers, grafts and buds. Warm, dry climates are best for olive culture. A rich, well-drained soil is most suitable, and the trees require a fertilizer. They are set about thirty feet apart, and the land must be kept well cultivated.

Olives have been grown in what is now the United States for about 150 years, and the crop yields more than $2,250,000 annually, most of it being produced in California. One of the best-known California varieties is the *Mission,* so named because the original tree of the variety was grown at the San Diego Mission.

Uses. About sixty per cent of the olive crop is used for making olive oil. This is an important food product, as two tablespoonfuls of it have as much nutriment as a pound of beefsteak (see Olive Oil). The fruit, too bitter to eat direct from the tree, is pickled, when either green or ripe. The process takes from thirty to sixty days. Green olives have little food value, but are eaten as a relish. Black, or ripe, olives are nutritious. The people of the United States and Canada consume on an average more than $11,000,000 worth every year.

OLIVE OIL, a clear, pale green or beautiful golden yellow, odorless oil, extensively used throughout the world as food, as medicine, and in the arts and manufactures. In America it is sometimes called *sweet oil,* particularly by the older generation. It is extracted from the fruit of the olive tree, and the methods used everywhere are more or less the same. The fruit is crushed into pulp, then put under pressure, and the extracted oil is caught in tubs half filled with water. All impurities sink to the bottom, and the oil taken from the top, when filtered, clarified and bottled, is a pale-green fluid known as the highest grade of olive oil. Further pressure of pulp produces inferior grades. Peanut oil, cottonseed oil and adulterated olive oil have been sold as pure olive oil, but pure food laws in the United States now make such practices illegal, as the labels must state exactly the composition of the contents of each bottle.

One of the chief uses of olive oil is in dressings for salads. It is also used in place of butter in cooking, and in some countries, particularly Italy, is eaten on bread. In medicine it is used as a mild laxative and as a food for poorly-nourished people. Like all fats, its fuel value is high, being 4,080 calories per pound (see Calorie), and because of this high fuel value it is a very important food. It is also used in preparing liniments, ointments and plasters. Olive oil is used to some extent as a lubricant. Much of it is employed in the manufacture of soaps and tobacco. Ancient Greeks and Romans used it extensively as an article of the toilet.

The best grades of olive oil are made in Southern France, those of Italy ranking second. The United States imports yearly about 6,000,000 gallons of edible olive oil. For description of the olive, see that title. See Adulteration of Foodstuffs and Clothing.

OLIVER, Frank (1853-), a Canadian journalist and statesman, founder and owner of the Edmonton *Bulletin,* and Minister of the Interior in the Laurier Ministry from 1905 to 1911. Oliver was born in Peel County, Ontario, but when a young man removed to the West, first to Winnipeg and later to Edmonton. With the development of the Northwest, especially of the Peace River Valley, Oliver's name will always be associated. In 1880 he established the Edmonton *Bulletin,* which he made one of the most influential Liberal dailies in Canada. From 1883 to 1888 he served as a member of the old Northwest Council, and from 1888 to 1896 sat in the Northwest Assembly, which took the place of the Council. During these years he grew in reputation and influence, both of which spread farther after his election to the Dominion House of Commons in 1896.

In 1905 Sir Wilfrid Laurier chose him to succeed Sir Clifford Sifton as Minister of the Interior and Superintendent of Indian Affairs. Oliver continued the system begun by Sifton to induce immigration to Canada, and the large increase in the population of the Northwest was due in a considerable measure to his personal efforts.

In 1910 Oliver was appointed to the Royal Conservation Commission. He continued to serve as Minister of the Interior until the resignation of the Laurier government in 1911; after that date he continued to represent Edmonton in the House of Commons as a private member.

OLIVER OPTIC, the pen name of WILLIAM TAYLOR ADAMS (1822-1897), an American editor and writer of stories for boys, who is a prime favorite with young people. He has been called the pioneer writer of juvenile fiction. He was born in Medway, Mass., July 30, 1822; he was educated in the public schools, and became a teacher in Boston. With a son of his own he had a good opportunity to study the literary taste of young people. His first book was called *Hatchie, the Guardian Slave,* and was written under the *nom de plume* of William T. Ashton.

Boys like his stories because he never preaches and he avoids tedious description. The morals of his stories are always good and are impressed upon the reader by admiration of the hero. His first successful book was *The Boat Club,* followed by six volumes called the *Boat Club Series.* These were followed by other series, representing from six to ten volumes each: *Army and Navy Stories, Boat Builders Series, Great Western Series, Onward and Upward Series, Young America Abroad,* etc.

Mr. Adams edited *The Student* and *Schoolmate* magazines from 1858 to 1866; *Oliver Optic's Magazine* from 1867 to 1875; *Our Little Ones* and *Our Girls and Boys* in 1881. In 1869 he was elected to the Massachusetts legislature. His published stories number over one thousand and his books more than a hundred. His last books, written in 1895, were *Across India; or, Live Boys in the Far East, A Lieutenant at Eighteen* and *In the Saddle.* He died March 27, 1897.

OLIVES, MOUNT OF, or **MOUNT OLIVET,** a low and short mountain range east of Jerusalem, separated from it by the Valley of Jehoshaphat and the Brook Kedron, celebrated for its association with the last days of Jesus. From Olivet He made His triumphal entry into Jerusalem (*Luke* XIX, 29), and here He wept over the city and foretold its doom. To it He returned and rested, in the home at Bethany, each night of the last week (*Luke* XXI, 37), till the night of the betrayal, when He retired to Gethsemane, "on the hither slope." From Olivet, He ascended into heaven (*Luke* XXIV, 50). A Mohammedan mosque to-day covers the traditional site of the Ascension, but the spot is visited every year by many tourists because of its sacred associations.

OLMSTED, *om'sted,* FREDERICK LAW (1822-1903), an American landscape architect, born in Hartford, Conn. In his early years he wandered far and wide, went to sea, was a student in the Sheffield Scientific School at Yale University, and finally took up farming on Staten Island. He made a walking tour through England in 1850 for the purpose of studying farming methods and landscape gardening.

His chief fame came when he was invited to lay out the grounds for the World's Columbian Exposition at Chicago, although in other landscape gardening he was signally successful. In all, he planned over eighty public parks, including Riverside, Morningside, Mount Morris Park and Central Park of New York; Washington and Jackson parks of Chicago; the Back Bay Fens of Boston, as well as other parks in the cities of Louisville, Buffalo, Milwaukee, Baltimore and Detroit, and he planned the Capitol grounds at Washington. His influence was marked in the Niagara Falls Reservation Committee. He founded the Metropolitan Museum of Art in New York City, the New York State Charities Aid Association and the American Museum of Natural History.

One of the distinctive features of all his landscape gardening is the preservation of natural resources and scenery as far as possible, and the absence of restraint and conventionality.

OLNEY, *ol'ni,* RICHARD (1835-1917), an American lawyer, Attorney-General and later Secretary of State under President Cleveland, in which office he distinguished himself by his wise adjustment of several important affairs. He was born in Oxford, Massachusetts, and received his education at Brown University and Harvard Law School, beginning the practice of law in Boston after having been admitted to the bar. Although he was interested in politics, he held no office except to serve a term in the Massachusetts legislature until he was appointed United States Attorney-General, and later Secretary of State. To his influence was due the settlement

RICHARD OLNEY
One of the most efficient of the long line of American Secretaries of State.

of the notable Pullman strike of 1894 in Chicago, by the interference of the Federal government, a step which set a precedent in such matters. In 1913 President Wilson offered Olney the ambassadorship to England, but he did not accept it, largely on account of his advanced age.

OLYMPIA, *o lim'pi a,* the scene of the ancient Olympian Games, where Grecian athletes strove for fame. It is a valley in Elis, Greece, where in ancient times were collected thousands of statues of the gods, temples, votive offerings and the most precious and priceless treasures of Grecian art. Here was the magnificent temple of the Olympian Zeus, containing the colossal statue of the god by Phidias, which ranked as one of the seven wonders of the world. Here also was the Prytaneum, the vast hall in which the victors dined in celebration of their conquests and the building in which all rules and regulations governing the contests were drawn up, the whole forming a quadrangle 1,800 feet long and 1,500 feet broad. Outside the walls of the quadrangle were the hippodrome, or race course, where chariot races were held, the stadium for foot races, a gymnasium and a theater.

The German government commenced excavations on the site of Olympia in 1875, and nearly all the ancient buildings have been uncovered after having been buried for ages under the soil washed down by the streams between which the Olympian valley lies. Fragments of sculpture, coins, terra cottas, and bronzes have been found, the most important discovery being that of the Hermes of Praxiteles. According to an agreement between the German and Grecian governments the originals of all discoveries remained in the possession of Greece, but Germany reserved the right to take casts from all sculpture, coins or other discoveries. A museum of Olympian relics has been established in Berlin.

OLYMPIA, WASH., the state capital, and the county seat of Thurston County, situated at the southern end of Puget Sound on Budd's Inlet and at the mouth of the Deschutes River. It is in the southwestern part of the state, sixty-five miles southwest of Seattle and 100 miles north of Portland, Ore., and is on the Northern Pacific Railroad and on the line of the Oregon-Washington Railroad & Navigation Company. There is regular steamboat service to other ports on the Sound and on the Pacific Coast. The population was 6,996 in 1910. In 1917 it was estimated at about 12,000.

Olympia is beautifully situated between hills of the Cascade Range, which are covered with extensive fir forests. The principal buildings of the city include the Temple of Justice, erected in Capitol Park at a cost of $1,000,000, the first completed building of a magnificent group which will include the new State House; the present Capitol building, the governor's mansion, a Carnegie Library, high school building and county courthouse. In addition to several small, attractive parks is Priest Point Park, a natural woodland of 256 acres which has a frontage of a mile along the inlet, and accommodations for bathing and boating.

The annual output of the sawmills of Olympia and vicinity is valued at $3,600,000. Woodworking factories produce large amounts of shingles, doors, sash and trim. Oysters and fish are shipped in great quantities and the city has a cannery for fruits and vegetables, and a knitting mill which produces goods for the Northwest and Alaska.

The first settlement in the vicinity was at Tumwater near the falls of the Deschutes, which now furnish power for manufacture in Olympia. After the opening of the gold camps in California in 1849, the fine timber of the north was exchanged there for other commodities, and the industrial life of Olympia began. The place became the capital of Washington in 1853 and was chartered as a city in 1859. H.L.W.

OLYMPIAD, *o lim'pi ad,* in Greek chronology, the period of four years that elapsed between two successive celebrations of the Olympic games. The system of counting time by Olympiads became prevalent about 300 B.C., and all events were dated from 776 B.C., the beginning of the first recorded Olympiad. The Olympiads were used as measures of time by later Greek historians and other writers to refer to preceding centuries, but they were never in contemporary use, as were months and years.

OLYMPIAN, *o lim'pi an,* **GAMES.** In 1896 the finest amateur athletes of the world, representing many nations, assembled at Athens to engage in a series of international contests. This event, the first modern celebration of the Olympian games, represented the revival, after a lapse of fifteen centuries, of the most important Greek festival of ancient times. Farther back than history records, some of the people of the Peloponnesus began to hold a contest in foot racing, in honor of Zeus, on the plain of Olympia, in Elis. Gradually the festival became an affair of national importance, celebrated by all the Hellenic states, and in 776

B. C. the Greeks began to keep a record of the names of victors. This date is the starting point in Greek chronology. The games were celebrated every fourth year, and the interval between two successive series was called an *Olympiad*. In the course of time boxing, wrestling, discus throwing, chariot racing and other athletic exercises were added to the original foot race. Those who entered the lists were compelled to undergo special gymnastic training and to show a name free from civic or personal dishonor. Until the conquest of Greece by the Romans, contestants had to be of pure Hellenic blood, but under the Roman régime both Greeks and Romans participated.

Great honors were accorded the victors. They were crowned with garlands of the sacred olive, their names were announced throughout the land by heralds, and statues were erected to them. To win a prize in the Olympian games was to confer upon one's native city the greatest possible honor. Probably the most far-reaching effect of the games was the inspiration which they gave to Grecian sculptors. In the strong, graceful bodies of the contestants, the artist had models of physical beauty that could nowhere else be found.

The Modern Games. In A. D. 396 the Roman Emperor Theodosius issued a decree forbidding the celebration of the games. The modern revival, in 1896, therefore, occurred exactly fifteen centuries later. This series of games was especially interesting because the members of the royal family of Greece took part in the festivities, and the awards were distributed by the king in person. Probably no event attracted more interest than the long-distance foot race from Marathon to Athens, held in honor of the messenger who brought to Athens the news of the victory at Marathon, and died after telling his story. It was planned to make this great international meet the first of an indefinite number of series, and accordingly other contests were held at Paris (1900), at Saint Louis (1904), at London (1908) and at Stockholm (1912). The celebration at Saint Louis was not international in scope, and so an intermediate series was held in Athens in 1906. The games for 1916 were scheduled to take place at Berlin, but their celebration was made impossible by the outbreak of the War of the Nations (1914). The Marathon races have been won as follows: in 1896 by a Greek; in 1900 by a Frenchman; in 1906 by a Canadian; in 1908 by an American; and in 1912 by a South African.

Consult Sullivan's *Olympian Games, Stockholm, 1912;* Gardiner's *Greek Athletic Sports and Festivals.*

Related Subjects. The following articles in these volumes will make clearer the references in the above discussion. The articles on the various forms of athletics mentioned above may also be consulted.

Athletics	Marathon
Epoch	Nemean Games
Isthmian Games	Pythian Games

OLYMPUS, *o lim' pus,* a mountain famous not so much because, with its height of 9,754 feet, it overtops all other mountains in Greece, but because in the early days in Greece its summit was looked upon as the abode of the gods. It is a massive mountain, at the eastern end of the ridge which divides Thessaly from Macedonia, and by reason of its ruggedness and inaccessibility no less than its height commended itself to the dwellers at its foot as a fitting abode for the rulers of men. The twelve great gods who made up the Olympian council, as well as many of the lesser deities, had special homes on the broad, many-peaked summit, but at the very highest point, where he might survey all the doings of gods and of men, Zeus had his great palace and assembly hall. Thence he sent forth his eagles to the uttermost parts of the earth, and thence he hurled his thunderbolts.

Gradually it came to seem to the people, and especially to the poets who had built up and crystallized their mythology, that the snow-covered, cloud-wrapped summit of Olympus could afford no cheerful dwelling place for the gods; also, the beginnings of exploration taught that the great mountain mass was not, as they had held it, the center of the earth. A new Olympus, therefore, was created—a wonderful place of brightness and warmth above the heavens—and thither the home of the gods was transferred. The change may be seen in the writings of Homer; the *Iliad* holds to the older creed, and places the gods on the Thessalian mountain peaks, while the *Odyssey* makes their home a sort of heavenly mountain, uncertain in locality, but still called by the name Olympus.

OLYPHANT, *ol' i fant,* PA., in Lackawanna County, is one of a group of mining boroughs about six miles northeast of Scranton, in the northeastern part of the state. It is on the Lackawanna River and on the Delaware & Hudson and the New York, Ontario & Western railroads and electric interurban lines. The mining of anthracite coal, silk throwing and

weaving, and the manufacturing of blasting powder are the supporting industries. Seventy-five per cent of the population are directly or indirectly engaged in coal mining. The number of inhabitants in 1910 was 8,505; in 1920 it was 10,236 (20 per cent gain). Here are many foreign-born residents, especially Poles, Slovaks and Russians, who work in the mines. The area of the borough is four square miles. It was settled in 1858 and incorporated in 1876. M.W.C.

OMAHA, *o'ma haw,* NEB., the first city of the state in population, commerce and industry, and the county seat of Douglas County. It is situated on the eastern border of the state, about midway between its northern and southern boundaries, and on the Missouri River, opposite Council Bluffs, Iowa. Lincoln, the state capital, is fifty-five miles southwest, Kansas City is 210 miles southeast, Chicago is 500 miles slightly northeast and Denver is 600 miles southwest. Omaha has become one of the greatest gateways of the West through the transportation facilities of the Union Pacific; the Chicago & North Western; the Chicago Great Western; the Chicago, Rock Island & Pacific; the Burlington; the Missouri Pacific; the Wabash; the Chicago, Milwaukee & Saint Paul; the Illinois Central and the Chicago, Saint Paul, Minneapolis & Omaha railways. A belt line encircles the city.

Extensive railway connections are also made through Council Bluffs, which is united with Omaha by several fine bridges. Over one-third of the transcontinental freight and passenger transportation is through Omaha. The river traffic is not important. In 1910 the population was 124,096; it had increased to 191,601 in 1920 (54 per cent gain). Omaha, South Omaha, Dundee and Florence were consolidated by act of legislation in April, 1915. Scandinavians, Germans and Austrians predominate in the foreign element. The area of the city is thirty-one square miles.

Parks and Boulevards. Omaha is built partly on a flat section near the river, where are located the business district and extensive railroad yards, and partly on bluffs, where the residence sections are found. Park reservations, comprising 1,351 acres, are distributed throughout the city and within easy reach of all the people; the largest of these are Elmwood, Riverview, Hanscom, Fontenelle, Miller and Kountze parks. The entire park system is connected by boulevards which are supplemented by beautiful park drives. The principal streets are wide, well paved and well shaded.

Buildings and Institutions. The architectural features of the city are the Federal building, which cost over $1,000,000; the Woodmen of the World and Union Pacific buildings, which cost $1,500,000 each; the $1,400,000 Hotel Fontenelle, built in 1915; the Omaha *Bee* building, the City National and Omaha bank buildings, the Army Headquarters, Grain Exchange, a $1,500,000 high school, the Auditorium and the Roman Catholic and Episcopal cathedrals. There are eleven hospitals, Saint Joseph's, the Methodist Emmanuel (Swedish), city, county and state hospitals being especially noteworthy. Omaha is the see of the North Nebraska Diocese of the Roman Catholic Church and of the Methodist Episcopal and Episcopal bishoprics. Features of interest in the city and vicinity are the Lininger Art Gallery, Fort Crook, Fort Omaha and Engineer Cantonment—the starting point of Major John P. Long's expedition West, in 1857.

Education. Omaha has twenty-one parochial schools, Creighton University (Roman Catholic), including colleges of arts and sciences, medicine, law, pharmacy and dentistry; the University of Omaha (which includes a Presbyterian seminary); Bellevue College; Brownell Hall; state medical college (connected with the University of Nebraska); Saint Catharine's Academy, Academy of the Sacred Heart, Mount

Saint Mary's Seminary for Girls, the state school for the deaf, and a public library with 65,000 volumes. Two noteworthy innovations in public school work are the high school of commerce, and the Fort School for backward boys.

Commerce and Industry. Omaha has over 300 wholesale houses, their business covering a territory that extends east to the Mississippi River, north to Manitoba, south and southwest to Texas and Mexico and west to the Pacific. The trade in live stock, grain, lumber, groceries and dry goods is enormous. It is the third largest meat-packing center in the United States, Chicago and Kansas City (in Missouri and Kansas) alone surpassing it; this is the leading industry, and it employs 10,000 people in South Omaha. The city is also fast becoming one of the leading primary grain markets in the United States; eighteen elevators in Omaha and its vicinity are necessary to accommodate the vast movement of grain.

Here is located one of the largest and most complete plants in the United States for smelting gold, silver, lead, copper and zinc ores; the value of ores reduced exceeded $30,000,000 in 1915. The extensive shops of the Union Pacific Railway are located here. In the 306 factories a great variety of products is made, creamery butter having the lead. Omaha makes more of this product than any other city in the United States, the annual output being estimated at 20,000,000 pounds. In 1920 there were 561 manufactories, employing 21,304 wage-earners. The capital invested was $149,885,000; the value of the products in that year was $452,237,000.

History. In 1825, J. B. Royce built a fur-trading station here, but the permanent settlement was not made until 1854. From that time until 1867 Omaha was the seat of government; when Nebraska became a state the capital was moved to Lincoln. In 1855 the first legislative assembly was convened in Omaha, and in 1857 the city was incorporated. Following the discovery of gold in Colorado in 1858, Omaha became the outfitting point for prospective miners, and its importance was further increased by the construction of the Union Pacific Railroad to the city in 1864. The Trans-Mississippi and International Exposition was held here in 1898. On March 23, 1913, the city was visited by a tornado that swept through the residence district, causing the loss of 150 lives and damage to property amounting to $5,000,000. In 1913 the commission form of government was adopted, with seven commissioners. *Omaha* was the name of an Indian tribe of the Dakotas. L.B.

O'MAN, an independent territory known as a sultanate, in the southeastern part of Arabia, extending along the Persian Gulf, the Gulf of Oman and the Arabian Sea, with a coast line of about 1,500 miles, as great a distance as from New York to Omaha. It is practically under British rule. The capital is Muscat, and the government is commonly known as the Imamat of Muscat, though the sultan never assumed the title of *Imam,* which is frequently bestowed upon him in error. Oman is the richest part of the peninsula of Arabia in mineral and agricultural products. Along the coast the mountains rise to an elevation of 10,000 feet above sea level, and the fertile valleys abound in sugar, coffee, rice and fruits. The area is 82,000 square miles, and the population, 1,500,000.

LOCATION MAP

The narrow black belt extending along the southern coast line of the Arabian peninsula is Oman.

OMAR KHAYYÁM, *o'mar ki yahm'* (? - 1123?), a Persian poet, astronomer and mathematician, whose poem, *The Rubaiyat,* translated by Fitzgerald, has been sung into the hearts of English-speaking nations. Born at Nishapur in Khorasan and educated there, he became royal astronomer, revised the Persian calendar, wrote an extremely important treatise on algebra, and is believed to have discovered the binomial theorem. The *Rubaiyat,* meaning *a collection of quatrains,* was brought into modern fame when Edward Fitzgerald translated one hundred of the more than five hundred existing specimens. The love of nature, the regret for the swiftness of life, the pleasure of love and the strain of gentle melancholy have made these verses among the most popular in literature.

OMENS, *o'menz,* are signs or occurrences which are supposed to tell of approaching events. In a primitive stage of culture, men always believed that spirits from the unseen world were about them and that their influence extended to the most ordinary events of life; therefore if one could read the signs aright he could learn somewhat of the future. This belief survives to the present day. To illus-

trate: Many people believe that the howling of a dog near a sick person is a bad omen. Other illustrations are plentiful. No intelligent person of to-day believes in omens.

OM'NIBUS BILL. An omnibus is a conveyance for the accommodation of many people; by analogy, then, when a bill comprising several measures that have little, or nothing, in common is introduced in a legislative assembly it is sometimes spoken of as an *omnibus bill.* This name was first applied in the United States Congress as a term of derision to the proposed Compromise of 1850, designed to settle a number of questions in dispute between the North and the South as to the extension of slavery and the treatment of fugitive slaves.

The entire theory of bills of this nature is faulty; when a number of unrelated items are crowded into one bill it is impossible to give each the measure of consideration it deserves. The constitutions of most states and provinces provide, therefore, that a single statute shall relate to one topic only, and that this must be clearly set forth in the title.

OMSK, *awmsk,* the capital of the province of Akmolinsk, and the former capital of West Siberia. It is situated on the Trans-Siberian Railway, at the junction of the Om and Irtisch, 280 miles southeast of Tobolsk, and is one of Russia's most important military stations in Siberia. Its fortress, constructed in 1766, is the strongest in West Siberia. The governor-general resides in Omsk, and the city has various manufactures and mining works. There are several military schools, and in these many of the famous Cossack regiments are trained (see COSSACKS). The trade is largest in brandy and tobacco. Population, 1913, 135,800.

ONEGA, *o ne' ga,* LAKE, a lake in the government of Olonetz, in Northern Russia, next to Ladoga the largest lake in Europe. It has an area of 3,764 square miles, which is about one-ninth that of Lake Superior or one-half that of Lake Ontario. It is 125 feet above sea level and has been navigated by steamboats since 1832, for it is free from ice from May to December. Fishermen and lumbermen live on its numerous islands. Lake Onega discharges by the Svir River into Lake Ladoga; a canal along the south shore connects that river with the Vytegra, and the Vytegra is in turn connected with the Volga and the Dvina by canals.

ONEIDA, *o ni' da,* a tribe of North American Indians who belonged to the confederation of Iroquoian tribes known as the Five (later Six) nations (see FIVE NATIONS). Their home originally was along the shores of Oneida Lake in New York state. They were about the only tribe among the Iroquoians who fought with the Americans during the War of Independence. For this reason the other tribes of the Iroquois, led by Joseph Brant (which see), attacked them, and they sought refuge in the American settlements until the war ended. Some returned to their former homes after the war was over and others emigrated to the Thames River district in Ontario. Most of the tribe settled upon the reservation on Green Bay, Wisconsin, early in the nineteenth century, and adopted the customs of civilization. They now number about 3,000; about two-thirds of these live in Wisconsin, a few in New York state and about 800 in Ontario.

Their proper name, *Oneyotka-ono,* meaning *people of the stone,* refers to a granite boulder on the shore of Oneida Lake, near the place where their original village stood.

ONEIDA COMMUNITY, a coöperative settlement founded at Oneida, N. Y., in 1848, by John Humphrey Noyes, and now owning many successful manufacturing plants. In the early years of its existence the Oneida Community was religious and communistic in its character. Its members believed in various peculiar interpretations of the New Testament, as advanced by Noyes, among others the possibility of Christians living absolutely free from sin and owning all things in common. These ideas caused them to be known as *Perfectionists,* or *Bible Communists.* They looked upon themselves as a big family; followed a plan of mutual criticism; considered one kind of work worth just as much as any other; gave women the same rights as men, and made the support and education of children the affair of the Community as a whole.

Their ideas of marriage were unusual. They did not believe in a legal bond, and they branded the permanent union of one man and one woman as a form of idolatry. "Complex marriage" was the name given to their system. These radical beliefs aroused strong opposition on the part of the orthodox churches, which caused the Community to move from Putney, Vt., where it originated, to Oneida. Here it became exceedingly prosperous through the invention of a steel game-trap by one of its members. Factories were built not only to manufacture these traps and various kinds of steel chains, but for fruit and vegetable canning and the manufacture of sewing and embroidery silk.

In 1879, on the advice of Noyes, the Community abandoned its system of complex marriage as a concession to public opinion. Two years later it was entirely reorganized and incorporated as a joint stock company, which has since paid good dividends to its stockholders. The only feature now suggesting the original plan is the coöperative dining room, laundry and library. Its factories are located at Niagara Falls, Ontario, and Kenwood, Sherrill and Niagara Falls, N. Y.

ONEIDA LAKE, a lake in Central New York, northeast of Syracuse, in the group of so-called Finger Lakes, although not so large as the five lakes commonly known by that term. It is about twenty-five miles long and four miles wide. Its outlet is by the Oneida and Oswego rivers into Lake Ontario. Before railroads were built Lake Oneida was a well-known commercial highway; it is now one of the natural sections of the New York State Barge Canal (which see). A former village of the Oneida Indians was built on the shores of this lake.

ONEONTA, *o ne on' ta,* N. Y., a city in Otsego County, situated southeast of the geographical center of the state, and on the Susquehanna River. Albany, the state capital, is eighty-two miles northeast and New York City is 224 miles southeast, by rail. Transportation is provided by the Delaware & Hudson, the Ulster & Delaware and the Otsego & Herkimer railways; electric lines extend to cities north. In 1910 the population was 9,491; in 1920 it was 11,582 (22 per cent gain). The area of the city is nearly four square miles.

Industrially, Oneonta is largely dependent on the Delaware & Hudson Railway, the immense repair shops and the offices of this company being located here. About 700 citizens serve the corporation in the capacity of engineers, firemen and trainmen, and about 800 are employed in the shops. Besides these, the city has three large wholesale feed and milling companies, and two large wholesale grocery houses. The post office, high school, municipal building and a $400,000 hotel, modern structures erected since 1905, Oneonta State Normal and Training School, Amelia Fox Memorial Hospital, a state armory and a public library, are all noteworthy.

The site of Oneonta was settled before the Revolutionary period, and the place has been known successively as Montgomery, Milfordsville and Klipnockie. It was incorporated as a village in 1848 and as a city in 1908. The growth of the place began with the establishment of the Delaware & Hudson Railroad interests here in 1870. P.S.C.

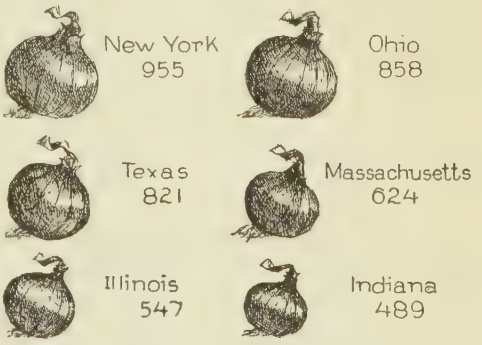
ONION, *un' yun,* a common garden vegetable with a strong taste and odor, widely used as seasoning and highly nutritious, whether eaten raw or cooked. It belongs to the same botanical family as the beautiful lily.

THREE VARIETIES

From left to right: yellow globe, white, extra early red.

The edible part is its underground coated bulb. Above ground the onion is a plant with hollow, tubular leaves, shorter than the flower stalk, which is also hollow, and is swollen at the middle. The flowers are small and white, and appear in rounded clusters. The strong odor of onions, extremely disagreeable to many people, is due to a volatile oil which has mildly stimulating properties. This oil, escaping into the air when onions are being peeled or cut, affects nerves in the nostrils which connect with the eyes, and causes the tears to flow.

Numerous varieties of onion are known. In shape they are round, oval or flat, and in color red, yellow or white. The small reddish onions



ONE YEAR'S CROP

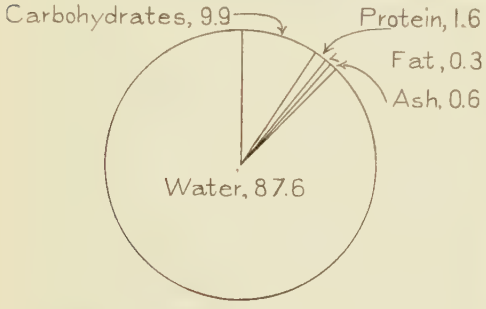
The six principal onion-producing states; figures represent the average annual yield.

have a stronger, sharper taste than those of larger size. Some onions are picked when young and green and are sold in bunches. Eaten in that way, their food value is more than half that of boiled potatoes. Mature

onions eaten raw are almost half as nutritious as boiled potatoes. When cooked, half of the nutrition is lost, but in that form they are more easily digested, and most of the odor disappears. Pickled onions are widely used, alone or in combination with other vegetables.

Bermuda, Strassburg, Spanish and Portuguese onions are most esteemed. California, Mexico, Italy and Spain are noted for the size and quality of their onions, owing to soil and climate conditions.

Onion Culture. Onions may be grown from the tropics to the coldest regions of the temperate zone. Soil is one of the most important items. Good, rich soil in a warm, sunny location is necessary, and sufficient drainage and



FOOD ELEMENTS IN AN ONION

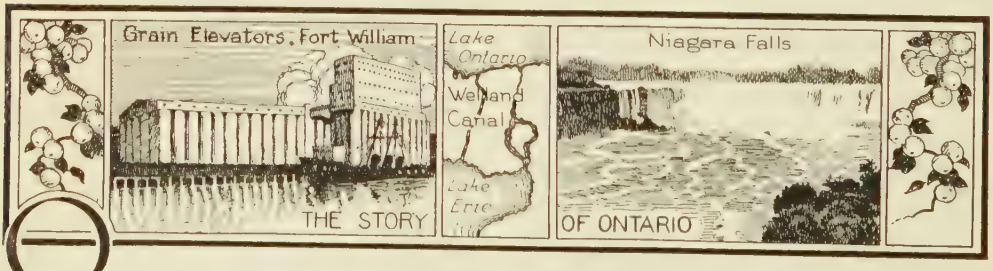
The heat-producing value of onions is very low —only 220 calories per pound (see CALORIE).

freedom from weeds are highly important. The soil should be enriched with manure or other fertilizers. Early in the year, when the soil has been plowed, harrowed and made mellow to a depth of four or five inches, seed from the previous year is sown in drills about nine to fifteen inches apart. The seed is covered with a quarter of an inch of soil, and the surface is made firm. As soon as plants appear, weeding must be started, and it must be continued. When the tops of the plants fall over it is an indication that the bulbs are mature. They are then gathered and allowed to cure for a few days, usually in the sun. Some onions are sent to market direct from the soil; others are stored for winter delivery. If onion bulbs are planted for the production of seed they must be allowed to ripen thoroughly in the field.

The greatest enemy of onion crops is the grub of a small fly known as the onion fly. It lays its eggs on the ground near small plants. When the maggot appears it feeds upon the bulb and kills it. No practical cure has been found. To protect the crop against an attack, however, as soon as small onion shoots appear, treat the rows with a whitewash of lime and water thick enough to make a thin surface crust. The maggots cannot penetrate this, but the young plants can break through it without difficulty.

For illustration of members of the lily family, see page 3432.

ONONDAGA, *on on daw' ga,* a tribe of North American Indians, belonging to the Iroquois stock, and forming one of the Five (afterward six) Nations (see FIVE NATIONS). Their original home was along the shores of Lake Onondaga in New York state, but they controlled territory as far north as Lake Ontario and southward to the Susquehanna River. They were the official guardians of the council fire of the Iroquois. In the eighteenth century some of the tribe were converted by French missionaries and migrated to the Roman Catholic Iroquois settlement in Canada. The rest remained in New York and loyally supported the Iroquois league. After the War of Independence the majority of those who supported the league moved to a reservation on Grand River, Ontario, where their descendants now live. About 300 live on the Onondaga reservation in New York. See IROQUOIAN INDIANS.



NTA'RIO, formerly UPPER CANADA, or CANADA WEST, is the most populous and wealthy province of the Dominion of Canada. Extending from the province of Quebec on the east to Manitoba on the west, its geographic position makes Ontario the connecting link between the east and west, the old and the new, in the great Dominion of which it forms a part.

Within its boundaries may be found all stages of progress, from long-settled and fully-developed agricultural and manufacturing communities to the rapidly-growing towns and rural communities made possible by the abundant natural resources of the less densely-populated parts of the province.

Area and Population. Ontario has a total area of 365,880 square miles, and is the second largest province of Canada, being exceeded in area only by Quebec. Owing to its natural boundaries, the province is very irregular in outline. The eastern part is separated from the United States on the south by the Saint Lawrence River, Lake Ontario and Lake Erie. On the southwest are Lake Huron and Lake Superior, beyond which the Rainy River with its chain of lakes completes the southern boundary. The western boundary extends north and south to the northeast corner of the old province of Manitoba; then it changes to a northeasterly direction, terminating on Hudson

OLD AND NEW ONTARIO

The solid black section represents the area of the province before annexations; the shaded portion is the territory added.

Bay, about eighty miles south of the mouth of the Nelson River. The Ottawa River forms a part of the boundary between Ontario and Quebec.

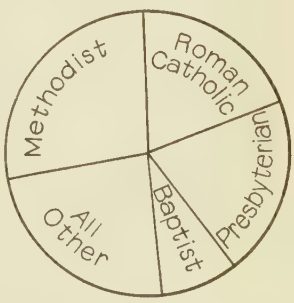
The greatest extent of Ontario from east to west is 1,000 miles, and the distance between the extreme northern and southern points only a little less. The eastern end is as far east as Atlantic City, N. J., and the western boundary is as far west as Lawrence, Kan. The southern point is about twenty miles south of Detroit and just north of the northern boundary of Pennsylvania, and a line extended eastward from the most northerly point would cross Hudson Bay 150 miles north of the outlet of James Bay.

Ontario lacks only 17,000 square miles of being as large as Texas and California combined, the two largest states in the Union. If compared with the states directly south of it, its area equals all of New York, Pennsylvania, West Virginia, Virginia, Ohio, Indiana, Illinois, Michigan and Wisconsin. It is nearly as large as France and Germany together, three and one-half times the size of Italy and two and three-fourths times the size of Japan.

Old and New Ontario. That portion south of the Albany River constitutes the original province, and is known as Old Ontario. Its area, 260,862 square miles, was about equal to that of Texas. In 1912 the region lying between the Albany River and the present northern boundary, or New Ontario, was added from the district of Keewatin, the remainder of that district being added to Manitoba.

The People. The census of 1921 gave Ontario a population of 2,933,662, which was about three-eighths of the entire population of the Dominion. Nine-tenths of the people live in less than one-tenth of the area, the region between the Ottawa River, Lake Huron and Georgian Bay. A large majority of the people are of English, Scotch and Irish descent. Many of the original English settlers came from the United States at the close of the Revolutionary War because they preferred to live under the British government. The early Scotch and Irish families were immigrants from the mother country.

A number of other nationalities are found in New Ontario, and since the beginning of the present century the percentage of foreign-born inhabitants has greatly increased in the larger cities, particularly in Ottawa, Toronto and Hamilton. There are about 21,000 Indians, some of whom reside on the islands in Georgian Bay. Only the southern part of the province is densely populated. Ontario has the largest proportion of urban population of any of the provinces, over fifty-



RELIGIONS OF ONTARIO

two per cent of the people living in cities and towns. But whether they dwell in town or country, nowhere in all the world will be found a people more intelligent, more substantial, more industrious and more thrifty than the inhabitants of this great province have shown themselves to be.

Religion. About one-fifth of the people are communicants of the Roman Catholic Church. The leading Protestant denominations are the Methodist, Presbyterian, Baptist and Anglican, in the order named. The relative rank in membership of the denominations is shown in the accompanying diagram.

Physical Features and Resources

Surface and Drainage. Ontario has neither prairies nor mountains; nevertheless, it is an attractive and a beautiful country. In general, the surface may be characterized as a low plateau crossed by two ranges of hills, or heights of land. The first of these extends from Kingston in a northwesterly direction and forms the watershed separating the streams that flow into the Great Lakes from those that flow into Hudson Bay and the Ottawa River. The bluffs on the north shores of Lake Huron and Lake Superior are a part of this range, which reaches its greatest altitude in the summit of Tip-top Hill (2,120 feet). This is the highest point in the province. The second highest is Isle Saint Ignace (1,864 feet). Mount Collins, in the Nipissing district, is 1,700 feet. The second range, known as the Niagara escarpment, forms the elevation between lakes Erie and Ontario, through which the Niagara gorge has been worn, and extends in a northwesterly direction, forming the hills commonly called the Blue Mountains, at the upper end of Lake Ontario, the tongue of land between Lake Huron and Georgian Bay, and the Manitoulin Islands. The highest land south of Lake Superior is found along this range of hills in Grey County, whose mean altitude exceeds 1,000 feet.

The region lying between Lake Ontario and the Ottawa River is rolling, with numerous low hills and shallow valleys. The land along the north shore of Lake Erie is low and flat, rising in gentle undulations to meet the height of land to the north.

The northern part of the province, including New Ontario, is a part of the great Laurentian plateau surrounding Hudson Bay, towards which the surface slopes from the height of land north of Lake Superior.

Drainage. The most important rivers in the north are the Rainy, forming a part of the boundary between Canada and the United States; and the Albany and the Attawapiskat, flowing into James Bay. The southern part of the province is drained directly into the Great Lakes or into the Ottawa River, which flows into the Saint Lawrence. The most important streams in the southern part of the province are the Trent, flowing into Lake Ontario; the Severn, the outlet of Lake Simcoe, and the Thames, flowing into Lake Saint Clair. Farther north the French River drains Lake Nipissing into Georgian Bay. Most of the streams are small and rapid. They are navigable only for canoes and small boats in stretches of quiet water between cascades. On the other hand, these cascades furnish abundant water power, and lend a charm to the landscape which more quiet waters cannot impart. The two great rivers bordering Ontario—the Ottawa and the Saint Lawrence—are described under their respective titles.

Ontario is dotted with hundreds of lakes whose clear waters beautify and enrich the country. Many of these lakes are widely known as favorite haunts of the fisherman and the camper. The largest—Simcoe, Nipissing, Nipigon and the Lake of the Woods—are described under their respective titles, as are also the important Muskoka Lakes. Besides its inland waters Ontario has an extensive water area from the four Great Lakes bordering upon it, and to these must be added Georgian Bay, with its thousands of islands which make it one of the most attractive sheets of water in North America.

Climate. Owing to its latitude and the influence of the Great Lakes, the southeastern part of Ontario has a mild climate. The winters are never extremely cold nor the summers extremely hot. The average winter temperature of Toronto is 23.7° F., and the mean summer temperature is 65.4°. In the northern part the temperature is lower, and along the high altitudes the winters are severe, although on account of the dryness of the atmosphere the cold is less penetrating. On the lower altitudes north of the height of land the climate moderates, and the winters are less severe than in some of the northern states of the American Union. An abundance of snow and frozen lakes and streams assure good roads for winter haul-

OUTLINE MAP OF ONTARIO

Showing the boundaries, principal cities, two navigable rivers and many smaller streams, mineral deposits, and the highest point of land in the province.

ing of lumber and ore, the leading products of this part of the province.

The annual rainfall varies from thirty to forty inches. It is evenly distributed throughout the year, assuring the farmer sufficient moisture for his growing crops. Throughout the province the climate is healthful and bracing.

Plant and Animal Life. The plant life in that part of Ontario lying between the Ottawa River and the Great Lakes is the same as that of other parts of North America in the same latitude. Hardwood trees, such as the oak, the maple and the hickory, are common, and numerous wild flowers are found. The wild violets and the hepatica and other early flowers herald the coming of spring, and the wild aster and the goldenrod adorn the fields and waysides in the summer and autumn. In the north the flora is similar to that of European countries in the same latitudes. There are fewer flowering plants, and the cone-bearing trees, such as the spruce and pine, abound.

Animals. Caribou, bear, several species of deer, a few moose and elk constitute the "big game" of Ontario. Small animals, valuable for their fur, are still numerous; chief among these are the mink, skunk, weasel, ermine, beaver, otter and muskrat. The trapper and hunter still plies his trade in the great forests and in the unsettled open country, and the fur trade is of such value as to demand the attention of the Dominion government to prevent the extermination of fur-bearing animals. All fur dealers are required to procure licenses from the provincial government. In summer thousands of song birds are found, and the secluded inland lakes are frequented by wild geese and ducks which come north to nest, then migrate southward on the approach of winter.

Fisheries. Ontario shares with the United States the fisheries of the Great Lakes, with the exception of Lake Michigan. Trout, whitefish, herring, pickerel and pike are taken in large numbers. Eels, perch, maskinonge (muskellunge) and catfish are also important. The annual value of the commercial fisheries exceeds $3,340,000, and the industry employs over 120 tugs and about 4,100 men. The manufacture of sturgeon caviare is an important branch of the industry, the annual output exceeding 7,000 pounds, most of which is shipped to New York, where it is prepared for European markets. See CANADA, subtitle *Fisheries of Canada.*

Minerals and Mining. Ontario is rich in all common minerals except coal. It leads the world in the production of nickel and cobalt, and is the leading province of the Dominion in the production of gold. The chief mineral region lies north of lakes Huron and Superior. Sudbury is the seat of the nickel mines, and the most important gold mines are around Porcupine, about 140 miles north of Sudbury. Cobalt is the site of the largest silver mines in the Dominion, and probably the center of one of the richest deposits of silver in the world. The ore contains cobalt in such large proportions that these mines have become the world's chief source of supply (see COBALT). Copper is found all along the north shore of Lake Huron. Iron is found north of Lake Huron and Lake Superior, and in the Rainy River district west of Lake Superior there are extensive deposits of iron ore. It is also found in smaller quantities in the southeastern part of the province, in Frontenac, Hastings and Haliburton counties.

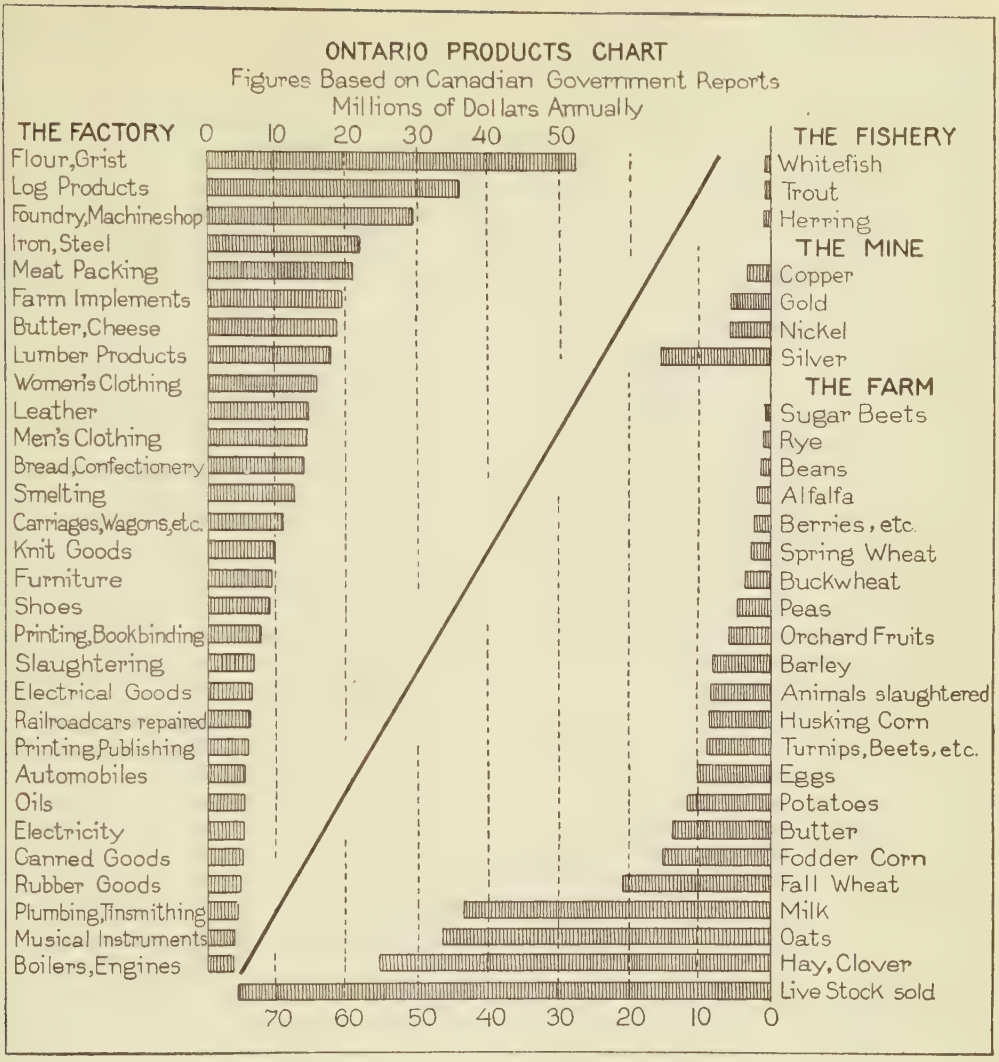
The chief smelting works are at Sault Sainte Marie, Deseronto, Hamilton and Midland. In the counties bordering on Lake Huron are valuable deposits of salt, which are reached by sinking wells from 1,100 to 1,700 feet. The salt is obtained by pouring water into the wells, then pumping out the brine and evaporating it. Petroleum is found in the counties of Lambton and Kent, also bordering on Lake Huron, and natural gas occurs in the same locality. The total value of the metals mined in Ontario in 1921 was $50,000,000, of this $11,665,000 was gold; $10,820,000 silver; $7,019,500 nickel and $764,515 iron ore. The natural gas used was valued at $2,299,307 and the salt obtained at $585,022.

Forests and Lumbering. Most of the best farm land of Ontario was originally covered with forests, and the pioneers had to clear the land. Even now it is estimated that about one-fourth of the area is forest. In the southern part the trees are chiefly hard woods—oak, maple, walnut, hickory, etc. In New Ontario are about 60,000,000 acres covered with spruce, jack pine and tamarack. On the Timagami Forest Reserve, around Lake Timagami, are large quantities of red and white pine. The inland lakes are set in forests, and trees line the river banks. There is abundant water power for converting the trees into lumber.

Forest Reserves. The following forest reserves and national parks are in Ontario: Timagami, 6,000 square miles; Missisagi, 3,000 square miles; Nipigon, 7,300 square miles; Algonquin Park, 2,060 square miles; Quetico, 1,560 square miles, including Eastern, Sibley and Rondeau. The total area of these parks is 20,038 square miles, and it is estimated that over seven billion feet of pine are on them. This is under the control of the government, and is sold under strict rules.

Lumbering. Ontario is next to Quebec in the production of lumber. The chief centers of the industry are the Upper Ottawa River, north of Georgian Bay, and west of Lake Superior, along the Rainy River. The logs are cut and hauled to the rivers in the winter and are floated down to the mills in the spring, when the streams are swollen by the melting snow. White pine lumber is exported to the United States and to England, and spruce is in great demand for pulp, used in the manufacture of paper. Shingles, lath and railway ties are produced in large quantities. The annual output of lumber, shingles and lath is valued at over $21,000,000.

Agriculture. Agriculture is the most important industry, and that part of the province between the Great Lakes and the Ottawa River is one of the most highly developed agricultural regions in North America. The soil is a rich black loam (see SOIL), the farms are in a high state of cultivation, and the farmers are prosperous. Hay, oats, wheat, barley, peas and other produce are raised. Flax is also an important product. The tongue of land between lakes Erie and Huron, because of its low altitude and the modifying climatic influence of the lakes, is well adapted to fruit, and peaches, pears, plums, grapes and small fruits are raised in abundance. Apples in large quantities are grown in all of Old Ontario except along the Ottawa River. Large quantities of fruit are exported to England, and canning factories enable the grower to preserve and market his surplus product.



The farmers find it more profitable to feed their hay and grain to stock than to sell it, consequently Ontario is noted for its fine horses, cattle and sheep. Dairying is an important branch of animal industry, and large quantities of butter and cheese are made. More cheese is exported from Ontario than from the entire United States; as a cheese producer, however, the state of Wisconsin is ahead of the province. Large quantities of condensed and powdered milk are manufactured. There are over 300,000 colonies of bees in the province, and the annual output of honey exceeds 2,000,000 pounds.

It was formerly supposed that the region north of the Great Lakes was not suitable for tillage, but it has been demonstrated that this great area contains millions of acres of fertile land as well suited to tillage as any other in the province. Hay, potatoes and the hardier small grains can be raised in abundance. Along the lines of railway this land is being taken by immigrants.

Government aid is given the farmers through the Department of Agriculture, which gives assistance by conducting fairs, forming local boards of agriculture, sending out trained agriculturists, conducting farmers' institutes, aiding in establishing courses of agriculture in the public schools and using the resources of the Department to make rural life more attractive.

Manufactures. Ontario possesses unlimited water power, an abundance of raw material and

good transportation facilities, so the conditions demanded by manufacturing industries are nearly ideal. These make Ontario the leading province in manufactures. Almost every sort of article used by the people is manufactured, but local establishments are not able to supply the demand for certain commodities, so a good trade in imported goods exists. Lumber products, such as doors, sash, shingles and wood pulp, constitute the chief products. There are iron and steel mills at Collingwood, Deseronto, Hamilton, Midland and Sault Sainte Marie, and the iron and steel industry is growing rapidly. Shipbuilding is an important industry at Collingwood, Port Arthur and Toronto.

Machinery, agricultural implements, electrical apparatus, furniture, carriages and wagons, pianos and organs, also paper and cotton and woolen goods are among the chief commodities of the factories. Most of the wheat raised is consumed at home, and flour mills are found in many localities. While the large cities are the chief manufacturing centers, small factories and shops are found in nearly all villages, and their output forms no inconsiderable part of the total manufactured products.

Hydroelectric Commission. This commission was created in 1906 by the provincial government to secure the purchase by the government of the power plant at Niagara Falls, which at the time of its completion was the largest plant in the world for generating electrical power. The scope of the commission's powers has since been extended to include government control of all important water-power sites. In coöperation with the municipalities the government has built electric railway and telephone lines and introduced electric lighting into many small towns, and in some instances into rural communities. Through this commission many small factories are able to avail themselves of the advantages of electrical power, which otherwise would be beyond their reach. The assistance furnished through this commission has been a great incentive to the manufacturing and transportation industries.

Transportation and Commerce. Ontario has over 10,000 miles of railway, and in the older part of the province the Grand Trunk and the Canadian Pacific, with their branch lines, bring all towns within a few miles of a railroad, if they are not crossed by one. The northern part of the province is crossed by the Canadian Pacific and the Grand Trunk Pacific, which passes through the clay belt. These roads are connected by crosslines. The Michigan Central enters the province at Niagara Falls and runs westward through Saint Thomas to Windsor and Amherstburg. The Canadian Northern Ontario extends from Toronto to the Muskoka Lake region, Parry Sound and Sudbury. The Timiskaming & Northern Ontario extends from North Bay to Cochrane, where it connects with the Grand Trunk Pacific. This line is owned and operated by the provincial government.

The chief railway centers in the southern part of the province are Ottawa, Toronto, Hamilton, Guelph, London, Owen Sound and Parry Sound. In the north they are Sudbury, Fort William and Port Arthur. The cities and larger towns have electric lines, and in the more densely populated sections rural communities are served by lines connecting the larger towns. The low cost of power obtainable through the Hydroelectric Commission is an incentive to the construction of interurban electric lines.

The Saint Mary's, the Ottawa and the Saint Lawrence rivers are the only streams navigable for large boats, but frontage on the Great Lakes gives Ontario unusual facilities for transportation by water. Port Arthur, Sault Sainte Marie, Collingwood, Parry Sound, Owen Sound, Windsor, Hamilton, Toronto and Kingston are important lake ports. There are a number of canals in the province, the most important being the Sault Sainte Marie, Welland, Rideau and Trent. See CANADA, subtitle *Transportation.*

Commerce. Most of the foreign commerce is with the United States and Great Britain. An extensive trade is carried on with Manitoba, Saskatchewan, Alberta and British Columbia. The chief exports are copper, silver, nickel, gold, forest products, especially lumber, wood pulp and railway ties, and agricultural produce, including butter, cheese and fruit. The chief imports are coal and a quite general list of manufactured goods.

Education, Government and History

Education. The public school system of Ontario is one of the best in North America. The schools are supported by local taxation and by government grants, and are free. The system is so thoroughly organized that there is complete affiliation from the kindergarten to the university. The qualifications for teachers are high, and the province maintains a large num-

RESEARCH QUESTIONS ON ONTARIO

(An Outline suitable for Ontario will be found with the article "Province.")

How many of the fifty largest cities of Canada are in the province of Ontario? (See list of cities in article CITY, page 1394.)

What city of the United States most closely resembles in size the largest city in this province?

How many cities has the Dominion of Canada which are larger than the largest city in Ontario?

In what sense may this province be called the connecting link between the old and the new in Canada?

How many provinces of Canada are larger than Ontario? How many have a larger population?

Of which province would you rather draw a map, Ontario or Saskatchewan?

What city of the United States is about in the same longitude as the easternmost point of Ontario? What city is just south of the western boundary?

How does the population of Ontario compare with the combined populations of the two great states of the American Union which it almost equals in area?

Which is larger, Old Ontario or New Ontario? How much?

How do the combined populations of all the other provinces compare with that of Ontario?

How does the average density of population of the province compare with that of the Dominion as a whole?

Trace on the map, using the direction of flow of the rivers as your guide, the main watershed of the province.

How does the greatest altitude of this province compare with the greatest altitudes of the provinces on which it borders? With those of the states to the south of it, across the Great Lakes?

How does the lieutenant-governor obtain his office?

Why has the southeastern part of Ontario a mild climate?

How do climatic conditions aid the chief industries of the northern part of the province?

What is done to prevent the extermination of the fur-bearing animals of the province?

What product of the fisheries is produced in Ontario, prepared in New York, and sold in the markets of Europe?

Of what two minerals does this province produce more than any other region in the world?

Describe the interesting method by which salt is procured in the Lake Huron region.

What part of the area of the province is forest land? Has the Dominion as a whole a greater or a smaller proportion of its land under forests?

How large a proportion of the total area of the province is in forest reserves? If 10,000,000 feet of pine were cut in these reserves each year, how long, according to estimates, would the supply hold out?

Why are the logs from the lumbering regions taken to the mills in the spring, and not in the fall or winter?

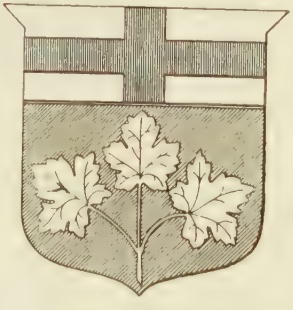
How does Ontario rank among the provinces as a producer of cheese? How many states of the United States surpass it? (See chart with article CHEESE.)

ber of county model schools, several provincial normal schools, one normal college and a faculty of education in the University of Toronto. High schools are found in all towns of fair size. The entire system is under the direction of the minister of education, who is a member of the provincial cabinet, and the courses of study and textbooks for the elementary schools are uniform throughout the province.

The agricultural college at Guelph has attained an international reputation and has students from other Canadian provinces and a number of foreign countries. The elements of agriculture and manual training are taught in the elementary schools. The University of Toronto (which see) is at the head of the school system, and all the higher educational institutions are affiliated with it. A dairy school and a school of mines are located at Kingston. There is a school for the deaf and dumb at Belleville and one for the blind at Brantford, and one for the feeble-minded at Orillia. Besides the University of Toronto, the leading universities and colleges are Queens at Kingston, McMaster at Toronto and Western at London. University College, Victoria College and Trinity College are federated arts colleges of the University of Toronto, while Knox, Saint Michael's and Wycliffe colleges are affiliated theological colleges in connection with the same university.

There are some excellent preparatory schools for boys, such as Upper Canada (founded 1829) and Saint Andrews at Toronto, Trinity at Port Hope, Ridley at Saint Catharines and the junior schools Hillcroft at Bobcaygeon and Mackenzie at Lakefield.

Government. There are three general departments of government—the executive, the legislative and the judicial. The lieutenant-governor, who is at the head of the executive department, is appointed by the Governor-General of the Dominion in council for five years and is assisted by a council of eight members, each of whom is a minister and the head of a department. These ministers must be members of the legislature. The leader of the cabinet is the premier of the province, and he with his ministers is the real executive. The legislature consists of 111 members elected by the legal voters of the counties. The judicial department is vested in a supreme court of judicature, consisting of the high court of justice with divisions of the king's bench, court of common pleas and court of chancery. The supreme court judges are appointed by the Governor-General in council.



COAT OF ARMS

For purposes of local government the province is divided into counties, townships, towns and cities. An elective council constitutes the governing body in each of these units. In the sparsely-settled regions of the north the district takes the place of the county, from which it differs in not having a governing council.

History. After Canada became a British possession in 1763, the province of Quebec was organized. The first settlers in Upper Canada were immigrants from the United States who removed to Canada during the Revolutionary War and immediately after its close. In 1791 the province of Quebec was divided into Upper Canada, which included Ontario, and Lower Canada, including the territory later known as the province of Quebec. During the War of 1812 (which see) a number of battles were fought in the province. In 1841 Upper and Lower Canada were united, following a rebellion in 1837 headed by William Lyon Mackenzie, who with his followers demanded that England give Canada a responsible government. This union continued until 1867, when all the provinces united to form the Dominion of Canada.

Since Confederation, the history of Ontario has been a record of progress along all lines of industrial and civic life, and since the beginning of the present century increasing attention has been given to the development of the vast natural resources in the north. Temperance legislation and women's suffrage have been prominent issues before the legislature. At the outbreak of the War of the Nations Ontario immediately adopted all war measures in support of Great Britain and has maintained them and added to them at every opportunity. Men and money have been freely given without stint or any thought of ever exhausting the supply. Each fund raised exceeded all former efforts, and aid was given to the relief of all the allied nations. As soon as wounded soldiers began to return, hospitals for convalescents were established and vocational training centers for the reëducation of the soldiers were organized on the most approved modern lines.

The whole of the province was organized on the platform of "increased production" under the Department of Agriculture as a special protective war measure, and response to official efforts was all that could be desired.

In 1916 the legislature prohibited the sale of intoxicating liquor until the war should end; in 1921 on submission to vote the province declared for prohibition of the traffic. At the session of the legislature in 1917 women were given the right to vote for municipal and provincial representatives. G.H.L.

For further relations of Ontario to the Dominion see CANADA, subtitle *History of Canada*. Consult Morgem's *Canadian Men and Women of the Time*.

Related Subjects. The following articles in these volumes will give much additional information on the subject of Ontario:

CITIES AND TOWNS

Almonte
Amherstburg
Arnprior
Aurora
Aylmer West
Barrie
Belleville
Bowmanville
Bracebridge
Brampton
Brantford
Brockville
Burlington
Campbellford
Carleton Place
Chatham
Clinton
Cobalt
Cobourg
Cochrane
Collingwood
Copper Cliff
Cornwall
Deseronto
Dundas
Dunnville
Fort Frances
Fort William
Galt
Gananoque
Goderich
Guelph
Haileybury
Hamilton
Hanover
Hawkesbury
Hespeler
Huntsville
Ingersoll
Kenora
Kingston
Kitchener
Leamington
Lindsay
London
Meaford
Midland
Napanee
New Liskeard
Newmarket
Niagara Falls
North Bay
Orillia
Oshawa
Ottawa
Owen Sound
Paris
Pembroke
Penetanguishene
Perth
Peterborough
Petrolea
Picton
Port Arthur
Port Hope
Preston
Renfrew
Rockland
Saint Catharine's
Saint Mary's
Saint Thomas
Sarnia
Sault Sainte Marie
Simcoe
Smith's Falls
Stratford
Sudbury
Toronto
Trenton
Walkerville
Wallaceburg
Waterloo
Welland
Windsor
Woodstock

EDUCATION

Queen's University
Toronto, University of

LAKES

Great Lakes, The
Lake of the Woods
Muskoka Lakes
Nipigon
Nipissing
Rainy Lake
Simcoe

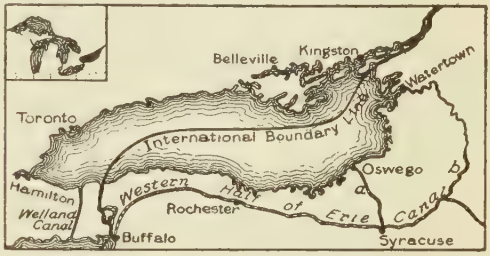
LEADING PRODUCTS

Apple
Butter
Cheese
Cobalt
Copper
Fish
Flax
Gold
Hay
Iron
Lumber
Nickel
Oats
Salt
Silver

RIVERS

Albany
Ottawa
Saint Lawrence
Saint Mary's

ONTARIO, LAKE, the smallest and most easterly of the five Great Lakes in North America, lying between the province of Ontario and the northwestern part of New York. The mean elevation of the surface of the lake above sea



LAKE ONTARIO

(*a*) Oswego branch of the Erie Canal; (*b*) Black River branch of same. All are a part of the New York Barge Canal (which see).

level is 247 feet, 326 feet lower than Lake Erie and 355 feet lower than Lake Superior. Its maximum depth is 730 feet. It is oval in shape, about 185 miles long, sixty miles wide, has a circumference of about 480 miles and an area of 7,240 square miles, being about one-eighth smaller than the state of New Jersey. It receives the waters of Lake Erie, at the southwest, through the Niagara River and Niagara Falls, and discharges through the Lake of a Thousand Isles and the Saint Lawrence River into the Atlantic Ocean.

Commercially it is of great importance, as it is navigable throughout its entire extent by the largest vessels, and never freezes, except at the shallow shores. The Erie Canal, in connection with the Genesee River and Oswego Canal, affords communication with the Hudson River and New York City. The Niagara River and the Welland Canal connect it for navigation with Lake Erie, at the southwest extremity, and at Ottawa City it is connected with the Ottawa River by the Rideau Canal. It is fed

by a number of rivers also, among which are the Black, Genesee, Oswego, Trent and Humber. It has many good harbors and fine fisheries. The principal cities on the coast are Toronto, Hamilton, Kingston and Oswego. T.E.F.

See GREAT LAKES, for chart showing comparisons of the five Great Lakes with respect to size, elevation and depth.

ONYX, *on'iks,* or *o'niks,* a beautiful variety of quartz that has its colors arranged in parallel bands. It is strictly a variety of agate; the colors are varying shades of red, green and brown alternating with white. The sardonyx of the Bible was onyx, with deep red and white bands. Onyx is easily carved and takes a high polish; it is therefore highly prized for mantels, table tops and interior finishings of expensive buildings; onyx of this quality costs from one dollar to two dollars per square foot. In the Orient, it is used considerably for pillars in Mohammedan mosques. It is sometimes the material for cameos, the figures being formed of one layer and the background of another in contrasting color.

Onyx Marble, or Mexican Onyx, a variety of limestone containing a small quantity of iron or manganese, which when polished becomes partially transparent. The iron and manganese produce beautiful clouded and banded effects, usually in shades of brown on a white background, which make the stone valuable for finishing interiors. Onyx marble is found in paying quantities in Mexico, Arizona, California and Colorado.

Related Subjects. The reader is referred to the following articles in these volumes:

Agate
Cameo
Chalcedony
Gems
Sardonyx

O'PAL, a precious stone admired for its beauty and variety of color. The Roman writer Pliny said of opals:

> There is in them a softer fire than in the carbuncle; there is the brilliant purple of the amethyst; there is the sea-green of the emerald—all shining together in incredible union. Some of their refulgent splendors rival the colors of the painters, others the flame of burning sulphur or of fire quickened by oil.

The ancients believed the stone possessed the power of magic, and the superstitious fancy that ill luck befalls the wearer of an opal, unless it be his birthstone, finds credence even to-day. The person who believes this superstition feels that he may wear the gem in safety if his birthday falls in October. Thus the old verse says:

> October's child is born for woe,
> And life's vicissitudes must know;
> But lay an opal on her breast,
> And Fate shall lull her cares to rest.

Opals are a compound of silica and water, the latter occurring in a proportion that varies from two to thirteen per cent. Pale shades of yellow, red, green and blue are the ordinary colors of this stone, which is not nearly so hard as quartz and is much more brittle. Of the several varieties the most valuable is the *precious* opal, also called *noble.* This variety, which displays an exquisite play of colors, is usually bluish- or yellowish-white. Because of its brittleness it is never cut into facets, like the diamond, but is polished with a convex surface. The finest specimens occur in Hungary, but the precious opal is also found in Germany, Central America, South America, Australia, Mexico and, in the United States, in Oregon and Washington. Other varieties are the *fire* opal, of a hyacinth-red color, with green and yellow reflections; the *girasol,* bluish-white with reddish reflections in a bright light; and the *common* opal, which shows no play of colors and may be red, brown, green, yellow or watery white. Some remarkable specimens of precious opals from the Hungarian mines are exhibited in the Imperial Museum of Natural History in Vienna.

OPEN-AIR SCHOOLS. See SCHOOL, subtitle *Public Schools.*

OPEN SHOP, an establishment in which both union and nonunion workmen may be employed, as opposed to the *closed shop,* which employs only members of trades-unions.

In the struggle between capital and labor the capitalist contends that employers have the right to make individual contracts with their employees, and that in demanding the closed shop and exclusion of all except union employees labor is interfering unjustly in the management of business concerns. The trades-unions maintain that labor has a right to a voice in the division of the wealth which it has produced; union men refuse to work in shops with nonunion men, unless consent of the union is given, because when both classes are present collective bargaining is impossible, and the question of wages, hours, sanitary conditions, etc., is entirely in the hands of the employers.

Related Subjects. The reader is referred to the following articles in these volumes:

Capital
Collective Bargaining
Eight-Hour Day
Labor Organizations
Sabotage
Strike

P'ERA, in common with picture galleries and public statues, is an important factor in developing an appreciation of the beautiful in art. It is a dramatic composition set to music and sung on the stage, accompanied by an orchestra and enriched by dancing and the usual stage accessories of scenery and costumes. A great many varieties and forms of opera have come into existence, of which the chief classes are *grand opera,* or *opera seria,* constructed upon rather serious themes, sometimes tragic and sometimes comic; *opéra comique,* or *opéra bouffe,* a lighter, more fanciful form; and *romantic opera,* or *opera dramatica,* of the Italians, combining elements of the grave and the comic. Modern opera is usually introduced by an instrumental overture, and one of the acts generally contains a ballet or pantomimic dance.

Although the Greek dramas were operatic in character, the opera proper is of modern date and of Italian origin. The first opera, *Dafne,* was produced in 1594, with words by Rinuccini, a poet, and the music by Peri, one of the most celebrated musicians of his time. The orchestra consisted of four instruments—a harpsichord, a harp, a violoncello and a lute; there was no attempt at airs, and the dialogue was rendered without regular rhythm or melody. *Dafne* was semiprivately performed, but *Euridice,* by the same composers, was produced in 1600 before a public audience, and so great was its success that it became the model for stage music. It marks the birth of real opera. Monteverde (1567-1643), a Milanese musician, not only added many instruments to the orchestra, but improved the recitative by giving it more flow and expression. Alessandro Scarlatti of Naples (1659-1725) wrote many beautiful melodies and cast them into regular mold. He was one of the first opera composers to make the *airs* harmonize with the dialogue.

Meanwhile opera was making great strides in Germany, France and England. Lully (1633-1687), in France, introduced the ballet. The operas of Henry Purcell (1658-1695) were characterized by a boldness of thought and great dramatic conception, which gave promise of the establishment of an English school of opera, but the dominating personality of the German composer Handel (1685-1759) overshadowed the influence that Purcell might have had over English music. To-day Handel's operas are not frequently heard, because of their lack of dramatic power.

The eighteenth century brought a revival and reform in opera history through the masterly hand of Gluck (1714-1787), who remodeled the opera entirely. Many were the battles he waged before he succeeded in bringing the artistic world to his point of view. His methods triumphed, and his influence may be seen in the work of the group of brilliant German masters that followed his lead—Mozart, Beethoven, Weber and Spohr. These are a few of the great names with which the early history of opera is identified. Gluck's name will forever be associated with his *Iphigenie en Aulide, Iphigenie en Tauride* and *Orfeo.* Another Colossus, Richard Wagner (1813-1883), stands foremost in the list of modern composers. His efforts have revolutionized opera, and every composer since his time shows some trace of his remarkable influence. He believed that in the rendering of opera the arts of music, action, poetry and scenery must stand on equal footing—none is subservient to the other; and in the music of his operas there is a flow of many melodies which work together into one glorious, harmonious whole. His works represent the height of dramatic perfection. He preferred that the name *music drama* should be applied to his works.

The following is a list of the leading operas of the early days and of the modern school:

Earlier Opera

Italian—*The Barber of Seville* and *William Tell*, by Rossini; *Il Trovatore*, *Aida*, *La Traviata*, *Rigoletto* and *Ernani*, by Verdi; *Norma*, by Bellini; *Lucia di Lammermoor* and *Lucretia Borgia*, by Donizetti.

German—*Don Giovanni* and *The Magic Flute*, by Mozart; *Fidelio*, by Beethoven; *Der Freischütz*, by Weber.

French—*The Huguenots*, by Meyerbeer; *Fra Diavolo*, by Auber; *Faust* and *Romeo and Juliet*, by Gounod; *Carmen*, by Georges Bizet; *Mignon* and *Hamlet* by Ambroise Thomas.

English—*King Arthur*, by Purcell; *The Beggars' Opera*, by Pepusch; *The Bohemian Girl*, by Balfe.

Modern Opera

Germany—*Tannhäuser*, *Lohengrin*, *The Flying Dutchman*, *Tristan and Isolde*, *The Meistersingers*, *Siegfried*, *Das Rheingold*, *Die Walküre*, *The Götterdämmerung* and *Parsifal*, by Wagner; *Salome* and *Don Quixote*, by Richard Strauss; *Martha*, by Flotow.

Italian—*Cavalleria Rusticana* and *Iris*, by Mascagni; *I Pagliacci*, by Leoncavallo; *Tosca*, *La Boheme*, *The Girl of the Golden West* and *Madame Butterfly*, by Puccini.

French—*Samson and Delilah* and *Proserpine*, by Saint Saëns; *Thaïs* and *Le Jongleur de Notre Dame*, by Massenet; *Pelleas et Melisande*, by Debussy; *Louise*, by Charpentier.

English—*The Troubadour* and *The Cricket on the Hearth*, by Mackenzie; *The Lady of Lyons*, by Cowen.

American—*Natoma* and *Madeleine*, by Victor Herbert; *Mona*, by Horatio W. Parker; *Poia*, by Arthur Nevin; *The Sacrifice*, by Frederick S. Converse.

Russian—*Mazeppa*, *Joan of Arc* and *The Enchantress*, by Tchaïkovsky.

Comic Opera, or Opéra Bouffe. Comic opera is a farcical form of opera, in which the characters, subject matter and music are intended to burlesque the more serious style of opera; for success it depends as much on its literary sprightliness as on its musical qualities. It had its rise in the *intermezzo* played between the acts of a dramatic piece. Offenbach (1819-1882) of Cologne is regarded as the inventor of the modern form of *opéra bouffe*. He wrote sixty-nine lyrical caricatures and engaged a theater in Paris for their production. When dialogue is interspersed with the music for the purpose of plot development, opéra bouffe becomes known as *musical comedy*, a form exceedingly popular in late years, especially in England and America.

William Gilbert and Arthur Sullivan of England were the composers of a number of delightful light operas, the forerunners of the present popular musical comedy, of which *The Mikado* and *Pinafore* are still great favorites; Reginald de Koven's *Robin Hood* and *Rob Roy* were among the first American successes along this line. Victor Herbert, who wrote the score for the popular *Babes in Toyland*, *It Happened in Nordland*, *Mlle. Modiste*, *Sweethearts* and many others, now heads the list of American composers of musical comedies. A large number of the musical comedies on the modern stage are spectacular shows characterized by cheap music and low comedy, but a few of high order have been produced within recent years, notably *The Merry Widow* and *The Chocolate Soldier*.

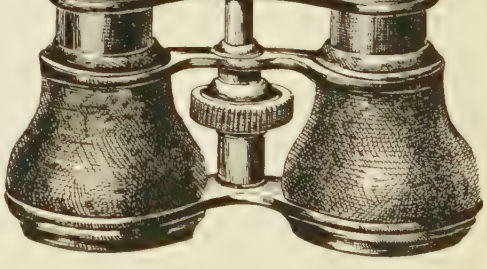
Comic opera and *opéra bouffe* are of the same nature, but must not be confounded with *opéra comique*, which, though set to music, is often of serious character and contains spoken dialogue. Beethoven's *Fidelio* and Weber's *Der Freischütz* belong to the latter class. R.D.M.

Consult Behenna's *Great Operas Told for Children;* Melitz's *The Opera Goer's Complete Guide;* Upton's *Standard Operas: Their Plots and Their Music.*

Related Subjects. The reader who is interested in opera will find much material for study in the articles on the great composers and singers listed under MUSIC, and also in those on the following topics:

Aïda	Lohengrin
Carmen	Nibelungenlied
Cavalleria Rusticana	Parsifal
Faust	Romeo and Juliet

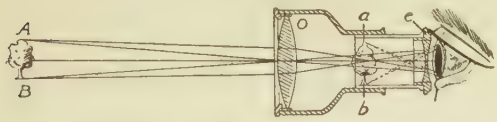
OPERA GLASS, a small, double telescope which magnifies the object upon which it is focused. In principle it is the same as the telescope, with which Galileo discovered the satellites of Jupiter. It consists of a double-



OPERA GLASS
In its ordinary and most convenient form.

convex lens for its object glass, and a double-concave lens for the eyepiece. The image of the object is magnified by the convex lens. The concave lens serves to direct the enlarged

image into the eye, so that the object is seen upright and larger than it is, instead of inverted as in most telescopes. An excellent glass for



FORMATION OF THE IMAGE
AB is the object; *o*, the double-convex lens; *ab*, the reflection of the object; *e*, the double-concave lens, or eyepiece.

use in the theater may be purchased for five dollars. See FIELD GLASS; TELESCOPE.

OPHIR, *o'fer,* an ancient region, probably in Southern Arabia, famed for the abundance and fineness of its gold. It is related in *I Kings* IX-X that Solomon built ships for commerce with Ophir, which brought him gold, silver, gems, ivory, apes and peacocks, and in *Psalm* XLV, doubtless composed in his praise, are the lines:

Kings' daughters were among thy honorable women:
Upon thy right hand did stand the queen in gold of Ophir.

OPHTHALMOSCOPE, *of thal'mo skohp,* an instrument for examining the interior of the eye, consists of a concave mirror from one to three inches in diameter, with a small opening and a magnifying lens through which the observer looks. When a bright light is placed close to and at one side of the patient's head, the light is reflected by the mirror directly into the pupil of the eye, and the observer can see a magnified image of the structure. If the eye is in a healthful condition it will appear bright red or orange, lined with a network of darker nerves and blood vessels. The instrument is employed also to discover symptoms of Bright's disease, and of brain and spinal troubles.

It was invented in 1847 by Charles Babbage, but its value was not at first realized. In 1851, it was improved by Professor Helmholtz.

O'PIUM, from a Greek word meaning *little juice,* is the dried juice of a species of poppy which grows best in tropical countries, especially in India and China. From it is obtained morphine (which see), one of the most important drugs in medicine. Opium has a bitter, nauseous taste and a peculiar odor, and possesses the power to cause deep sleep and insensibility to pain. When taken in small quantities it stimulates the brain and marshals all sorts of weird fancies, but the effect soon disappears. In a month, a craving for it, like the craving for alcohol, is formed. It is usually eaten or smoked.

The seeds of the plant are sown in November, the flowers appear in January, and soon after the green seed pods are pricked so that the thick white juice may ooze out. This sap is collected, dried and made into little brownish-red pellets, which are packed in chests.

The Canadian government restricts the importation of opium by levying heavy customs duties, and entirely prohibits powdered opium prepared for smoking. The distribution of the drug in the United States and in all its outlying possessions is regulated by a law carrying heavy penalties for its violation, which went into effect March 1, 1915.

Opium War. Opium was introduced in China in the thirteenth century by Arabs, and was first used as medicine. By the seventeenth century the habit of opium smoking had fastened itself on the people. The Emperor Yung

THE OPIUM POPPY
(*a*) Ripe capsule; (*b*) cross section of capsule, showing seed.

Cheng issued an edict in 1729 forbidding its importation from India, but it was smuggled into the country. Accordingly, in 1839, the Emperor Tao-Kwang sent a man to Canton to put a stop to the smuggling. He destroyed a shipload of opium worth in American money

ten million dollars. The English tried to punish the Chinese for the loss, and for two years (1840-1842) what is known as the Opium War raged. At the end of the struggle China agreed to allow opium to be brought into the country.

So many people used it that it was grown extensively instead of rice, and famines resulted. A great deal of money was also taken out of the country to pay for what came from India, so in 1906 it was again forbidden in the schools and in the army; all those who used it were ordered to break off the habit, and the people were forbidden to grow it. In 1916 the Chinese nation, as a result of its awakening politically, morally and socially, took steps to end the opium traffic throughout the country for all time, permitting a period of ten years (until 1926) for adjustment of affairs to the new condition.

OPORTO, *o pohr' toh,* the seaport and chief industrial city of Portugal, next in size to Lisbon. Port wine, its principal article of export, takes its name from this town. Oporto is situated on the steep, rocky right bank of the Douro River, three miles from its mouth and about 175 miles northeast of Lisbon. It is encircled by pine-covered mountains; and the houses, brightly painted and surrounded by wonderful gardens, rise irregularly from the river's edge. Of two recently-constructed bridges which span the Douro one is counted among the largest and most beautiful of its kind in Europe. Crystal Palace, embowered by gardens and erected on one of the crags overlooking the river, and the "Tower of the Clergy," a granite structure 246 feet high, are two of the city's finest buildings.

Many of the monasteries are still standing, although now put to other uses; one is a citadel; another, the exchange; a third, barracks, etc. There are also museums, libraries and many institutions devoted to education and the fine arts. The city contains one of three universities of Portugal. Important manufactures are hats, silks, cotton, woolen and linen stuffs and soap. Oporto was an important town during the Middle Ages. In 1808, during the wars with Napoleon, it was captured by the French, but in the following year they were driven out by the English under the Duke of Wellington. Population in 1920, by census report, 203,981.

OPOSSUM, *o pos' um,* the name of an animal belonging to the *marsupial family,* that is, having an exterior pouch or bag in which the young are carried after birth. It is native to America and includes a great number of species, of which the best known is the common Virginia opossum, famous in negro legends of the South. This animal is remarkable for its cunning and its skill in feigning death when threatened with harm, and the expression "playing 'possum," to indicate deceit, has become proverbial.

It is the size of a mouse, when young, and grows to be larger than a cat. The head is long and muzzle-pointed, with large, naked ears and many sharp teeth. The hair is soft and wool-like, with stripes down the back, and it

THE OPOSSUM

has a long, flexible tail, by which it can hang from tree branches. Fruits, vegetables and small animals form its principal food. It lives in trees, usually, and roams principally after nightfall, consequently hunting the "possum" with dogs at night is a favorite sport. The flesh of the animal is white, and when baked is considered a delicacy by the negroes of the South, although the animal is not clean in its habits. The young are numerous, and remain with the mother until well grown.

OPPER, *op' r,* Frederick Burr (1857-), an American cartoonist, creator of *Happy Hooligan, Alphonse and Gaston, Our Antediluvian Ancestors* and numerous other characters familiar to those who enjoy the Sunday newspaper comic supplement. Opper not only has the gift of making his illustrations humorous, but he is equally successful in giving them point, and his representations of unscrupulous "bosses," the "trusts," stock gamblers and the like rank with the best political cartoons of the day. He was born at Madison, O., and began his career in New York City in 1872. Besides illustrating the works of Bill Nye and Mark Twain, and Finley Peter Dunne's *Mr. Dooley,* he has been associated with the Hearst newspapers for many years. His own publications include *Folks in Funnyville, Puck's Opper Book* and *Maud the Matchless.*

OPTICS, *op'tiks.* See Light.

OPTIMISM, *op'tim iz'm,* from a Latin word, *optimus,* meaning *best,* is the belief that there is a great deal more good than evil in the world, that the good will ultimately triumph over the evil, and that since God is all powerful this must be the best world He could make. From Socrates to Leibnitz, who was the greatest modern optimist, philosophers have held that evil is in the world so that men may learn to choose the good. *Pessimism,* which is from the Latin word *pessimus,* meaning *worst,* and which means the opposite of optimism, has had and still has numerous followers who believe the world could be no worse. Progress of a nation or race is usually marked by an advance in optimism. See Pessimism.

ORACLES, *awr'a k'lz,* in mythology, were the replies given to inquirers by the deities they worshiped. Sometimes, too, the name was applied to the temple or place where these responses were given. Almost all of the nations of antiquity believed that their deities interfered in their personal affairs, and that if inquiries were made the gods would give them such advice as to guarantee success in their undertakings or at least foretell future events so that they might know whether or not an enterprise was a wise one to undertake. Not everyone was able to interpret what the gods said, and often certain established families of priests or interpreters delivered the messages of the gods; not all places were equally favorable for the consultation of a god, and some particular localities came to be known as especially favorable (see Delphi).

Sometimes the oracles came through signs, which were interpreted by an attendant; sometimes those who wished to consult a god slept in a hall of his temple and received messages through visions, which were explained by the priests. Very frequently the replies of the gods were so ambiguous that almost any meaning might be attached to them. Thus when Xerxes planned to invade Greece he consulted an oracle as to the outcome of his campaign, and received the answer, "If you cross into Greece you will bring great disaster to an empire." This was very satisfying to the ambitious king, who took it as sure prophecy of success; but it was his own empire upon which he brought disaster. Many of the oracles degenerated into places where trickery and charlatanry were practiced in the most open way at the expense of poor and credulous worshipers, who dared not protest.

ORAN, *o rahn',* a fortified seaport of Algeria and capital of the department of Oran. It is a well-built town, European in aspect, with few old traces remaining of its long and exciting history. It is situated on the Gulf of Oran, an arm of the Mediterranean Sea, 260 miles southwest of Algiers. Founded in the tenth century by the Arabs, and growing rapidly into an important seaport, it was taken and retaken, sacked and rebuilt by the many conquerors of North Africa. Under the sultans of Tlemçen it reached its greatest prosperity, carrying on a large trade in woolen goods and armor with Italy, Spain and Portugal, and possessing fine mosques, schools and palaces.

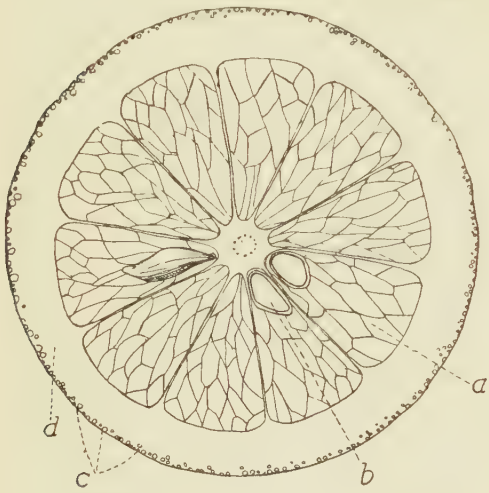
When the Moslem refugees from Spain gained control they turned the honest trade into piracy, and for many years Oran was a fort of the Barbary pirates. The Spaniards, unable to endure this sort of robbery, conquered the city in 1532 and used it as a penal settlement, but gave it up in 1792 after an earthquake had nearly destroyed it. In 1831 the French took possession, and under their rule prosperity has revived. It enjoys a thriving trade, exporting cereals, wine, olive oil, cattle, hides, potatoes, tomatoes and esparto grass, which is extensively used in paper making, and importing manufactured goods and coal. Population of city and suburbs, 1911, 123,000.

ORANGE, *ahr'enj,* a "luscious fruit of sunset hue," related to the lemon, lime and citron, and one of the most popular and commonly known of fruits. An orange is a globelike mass of juicy, sweet-sour pulp, arranged in from eight to twelve wedge-shaped sections, and surrounded by a tough, porous, golden-yellow rind. Some varieties contain several seeds in each section or slice; but the most desirable oranges are seedless; the latter are called *navel* oranges, because of a peculiar growth near the top. In some oranges the skin clings tightly to the pulp; in others, like the mandarin and the tangerine, the skin is very loose and easily removed.

Description of the Tree. The trees on which these citrus fruits grow are evergreen. They rarely grow higher than thirty feet, and are usually kept lower for convenience in gathering the crop. The branches hang low and bear oblong-oval, glossy, dark-green leaves, which are finely-toothed, pointed at the tip and winged at the base. The flowers are borne singly or in small clusters, and are thick-petaled, white, waxlike and wonderfully fragrant. Sometimes green fruit, ripe fruit and blossoms may be seen

at the same time on the trees. Because of their beauty and fragrance the flowers have long been worn in bridal wreaths. Florida has chosen the orange blossom as its state flower.

Distribution and Kinds. Oranges are natives of Asiatic countries, but have been introduced



CROSS SECTION OF AN ORANGE

(*a*) Central edible part of fruit; (*b*) seed, cross section, and its location; (*c*) oil reservoirs, near outer surface of rind; (*d*) corky layer of rind.

into the United States, the West Indies, the Azores, Europe and Africa, where they are widely cultivated. In the United States, California and Florida lead in the production of oranges. Almost 25,000,000 boxes of oranges are grown in the United States every year, and over half are raised in California. The seedless *navels* are most popular. Oranges grown in Florida are known as *russets;* they have lighter-yellow pulp than the others, and the peel is

ORANGES GROWN IN A YEAR

Production in the United States, representing the average crop during five years.

bronze colored, hence the name. The *mandarin* orange, introduced from China, is small and somewhat flattened, and has an exceedingly rich and agreeable flavor. *Blood oranges* are so called because they have a darker and somewhat red juice.

Uses. The refreshing juicy pulp of the orange makes it a popular dessert fruit. The juice also affords a refreshing drink for fever patients. Orange peel is used in the making of marmalade and to flavor puddings and other cookery, and when candied is a dainty confection. The leaves of the orange tree and small, unripe fruit contain a volatile oil which is used in the manufacture of perfumes. Orange trees are especially cultivated by some florists for their flowers, to be used in bridal wreaths and to be distilled with water to make a perfume called orange-flower water. The wood of the orange tree is fine-grained and of a yellowish hue; it is used for inlaid work and for small, turned articles.

Orange Culture. Oranges are grown from seed. As a rule the seedling is a variation from the parent stock, and desired varieties are usually obtained by budding (see GRAFTING, subhead *Bud Grafting*). Deep, rich, moist soil with good drainage is best. Oranges cannot be grown where severe frosts occur during the growing

ORANGE BLOSSOMS

season, but dry land can be used, if properly irrigated. Trees two years from seed are ready to bud, and a year or two later are set into an orchard and are placed thirty or forty feet apart. Clean cultivation must be continually practiced, and the trees require liberal amounts of water and the aid of fertilizers, unless the soil is exceptionally rich. About four years from budding the trees will begin to bear, and with proper pruning and care one tree will produce 500 or more oranges each year for from fifty to a hundred or more years.

Harvesting is done by hand by cutting the fruit from the tree. After careful scrubbing by hand or by machinery, the fruits are assorted according to size, wrapped in tissue paper and packed for shipment in wooden boxes.

Diseases and Insects. Like all other citrus fruits, oranges are subject to numerous destructive diseases and insects. *Foot-rot* is the most

widespread of the diseases. Starting at the base of the tree, it creeps upward and causes leaves and branches to die and the bark to peel off. The most effective cure is removing the soil around the crown of the tree.

Scale insects, the worst of which are known as *orange chionaspis,* can be controlled by hydrocyanic acid gas fumigation and by spraying with a kerosene emulsion. Rust mites not only spoil the appearance of the fruit and make it unmarketable, but also lessen the vigor of the tree. Spraying with sulphur is the best remedy, and almost any insecticide will kill the adult mite. Orange thrips have caused considerable damage in feeding on leaves, buds and fruit. Four applications of lime-sulphur combined with blackleaf tobacco extract, three made in the spring and one in August or September, should control this pest. No cure is as yet known for *blight,* a disease which attacks bearing trees only and causes the wilting, then the final destruction of the tree. E.D.F.

Consult Mills's *Citrus Fruit Culture,* in California Agricultural Experiment Station Bulletin 138; Harcourt's *Florida Fruits;* Coit's *Citrus Fruits.*

ORANGE, a color of the solar spectrum, that appearing between the yellow and the red. Orange is a reddish-yellow color and may be produced by mixing a small quantity of red with yellow pigment. The tint varies with the proportion of red used. There are numerous orange dyes having different tints and hues on the market, each bearing its specific name, as *cadmium orange,* a deep orange shade of cadmium yellow. Most orange dyes are prepared from coal tar and designated by numbers, as *orange I, orange II,* etc. See COLOR; LIGHT, subhead *The Spectrum.*

ORANGE, N. J., an attractive residential suburb of New York City, situated in the northeastern part of the state and in Essex County, four miles northwest of Newark and twelve miles west of New York City. It has the Delaware, Lackawanna & Western and the Erie railroads, and electric interurban lines which communicate with Newark, Jersey City and other cities and towns. In 1910 the population was 29,630; in 1920 it was 33,239, a gain of 12 per cent.

Orange is beautifully located at an elevation of from 150 to 200 feet, on the slope of Watchung Mountain, a ridge extending northeast and southwest, and rising to a height of 650 feet above tidewater. The city embraces parts of the townships of East Orange, West Orange and South Orange, all suburbs of New York City; combined, they are called the *Oranges.* They form an admirable residential district, with beautiful parks, elegant homes, abundant shade trees, hedges and gardens, and many miles of good drives. Although the people of Orange are largely employed in Newark and in New York, its home industries are important. It has extensive manufactures of felt hats, druggists' supplies, lawn mowers, malt liquors and phonographs, about 5,000 people being employed in the various manufacturing plants. Near Llewellyn Park, in West Orange, is the laboratory of Thomas A. Edison.

Noteworthy buildings are the Metropolitan and Decker buildings, Masonic Temple, Music Hall, Orange Memorial Hospital and the House of the Good Shepherd. In addition to the public schools there are Seton Hall College (Roman Catholic), for boys, Locke College, for boys, a number of private schools and the Stickler Memorial and public libraries.

When the first settlement was made here in 1666 by a colony from Connecticut, it was a part of Newark and was called Newark Mountain. The inhabitants established a church in 1718, and the community was known as the Mountain Society. In 1781 this church was known as the Second Church of Newark, and at present it is the First Presbyterian Church of Orange. The place was known as Orange Dale from 1791 until 1806, when it became independent of Newark and was incorporated as a separate town. South, West and East Orange were established independently in the years 1861, 1862 and 1863, respectively. In 1872 Orange received its city charter. G.W.F.

ORANGE FREE STATE, an inland province in South Africa, since 1909 a member of the Union of South Africa, a confederation of British colonies. It has an area of about 50,300 square miles, practically that of England, and is a part of an immense plateau, the top of which is nearly a mile above the sea. This section drains west and north into the Vaal River; to the south of it is the Orange River. The colony is nearly as far south of the equator as the southern part of the United States is north of that line, and the seasons of the two sections are reversed. In January, a summer month, the average temperature is 95°, and in June it is 40°. On account of the high altitude the climate is bracing and healthful.

The country in its natural state was prairie land covered by wild grasses and such small shrubs as the thorny acacia. It and the surrounding provinces were occupied by a most

varied and interesting group of wild animals, including the African lion, tiger, zebra, elephant, etc. These have almost disappeared, the victims of European hunters of big game.

The development of the country has been comparatively recent. Before the middle of the nineteenth century it was in a wild state, inhabited by wandering bands of negroes. About 1836 the Boers from Cape Colony on the south migrated northward to this section

LOCATION MAP

Surrounding the Orange Free State are (*a*) Province of the Cape of Good Hope; (*b*) Basutoland; (*c*) Natal; (*d*) Transvaal; (*e*) Bechuanaland; (*f*) German Southwest Africa (wrested from Germany during the War of the Nations).

and founded what was known as the Orange River Colony. This migration, or *move,* is known as the *Great Trek,* a term often used by Kipling in his verses. The British claimed possession, but in 1854, after much dispute, it was declared independent, and became known as the Orange Free State. When war was declared in 1899 between the Transvaal, its northern neighbor, and Great Britain, the Orange Free State joined forces with the Transvaal. The Boers were defeated, and in 1900 the Orange Free State was declared a possession of the British Crown, the name being changed to Orange River Colony. Nine years later, under its present name, it became a part of the Union of South Africa.

The population of 307,375 (1921) is considerably more than half native, or black. The chief industry is cattle and sheep growing. Farming is developing as the added moisture from cultivation increases the fertility of the soil. There are also many ostrich farms, and ostrich feathers are among the chief articles of export, when those ornaments are in demand. The mining of diamonds, gold and coal constitutes an important industry, though the mines are neither so rich nor so extensive as in some of the neighboring colonies.

The British government has established schools, but as these are not free, education is not compulsory. The province has about 1,350 miles of railroad, the principal line being the Cape-to-Cairo road. The geographical location of the Orange Free State makes it of the greatest importance in the development of South Africa. Bloemfontein, the capital and largest city, is a base of supplies for a vast interior region. M.W.

Consult Wright's *Thirty Years in South Africa;* Bryce's *Impressions of South Africa.*

Related Subjects. The following articles in these volumes will give added information on topics connected with the Orange Free State:

Bloemfontein	South African War
Boer	Transvaal
Ostrich	Union of South Africa

ORANGE RIVER, the longest river of South Africa, which, with many curves to the north and south, extends almost across the continent. It is also called the *Garib,* or *Great Water,* by the native Hottentots, the name having been changed by the Dutch into *Gariep.* Rising in the highest eastern mountains, in Basutoland, less than 200 miles from the Indian Ocean, and emptying into the Atlantic, its channel extends over 1,300 miles, and in its winding course it drains over 400,000 square miles of territory. The largest of several tributaries is the Vaal.

The stream is bordered by steep banks and contains many cataracts and cascades. At the Great Aughrabies, or Hundred Falls, the waters pour over a series of ledges and fantastically-shaped islands, dropping 400 feet in sixteen miles, and below rush through a rocky gorge walled by high cliffs. The river is deflected by the mountain barrier near the Atlantic coast and makes a bend of ninety miles to the north. A large sand bar obstructs the mouth of the stream, which is but a mile wide, and similar bars and rapids in its course make it at all times inaccessible to seagoing vessels. Above the bar small vessels navigate the river for limited distances. Where the stream passes through fertile land, its waters are used for irrigation purposes, and with the further development of the country it will be of increasing importance.

This "great river, whose waters always flowed," was discovered in the early part of the eighteenth century by the Dutch settlers in Cape Colony. It has led many explorers into the interior of South Africa, and along its banks lie the most important states of the southern part of the continent. It was named in honor of the House of Orange.

ORANG-UTAN, *o rang' oo tan',* or **ORANG-OUTANG,** *o rang' oo tang',* from a Malay

word meaning *man of the woods,* is the name of a giant, manlike ape which inhabits Sumatra and Borneo. It is from four to five feet high and is covered with coarse, red-brown hair; its skull is higher than that of any other ape, and its brain is next in size to man's. The arms are extremely long, reaching to the ankles when the animal stands erect.

Whenever possible, the ape makes its way by swinging from branch to branch in the trees. Nests or platforms are built from forty to fifty

THE ORANG-UTAN

feet above the ground, and are used for sleep and refuge. The orang-utans subsist entirely on vegetables. When going for water, the animal is sometimes forced to walk on the ground. Usually its method is to walk on the knuckles of the hands and the outer sides of the feet, but occasionally it raises itself on its feet, and grasping branches overhead, walks upright by their help. Traveling in this manner, it can cover five or six miles an hour. These apes live alone or in pairs, never in communities. They are easily tamed if caught young, and when trained show considerable intelligence.

ORATION, *o ra' shun,* a formal address, in eloquent language. It aims to arouse the feelings, carry conviction, and often to stir the hearers to action. A typical oration consists of three parts—the introduction, the body and the conclusion. In the *introduction* the speaker explains his subject and indicates the course of argument he proposes to follow; in the *body* he advances his arguments or defends his principles; in the *conclusion* he summarizes the inferences to be drawn and makes his plea for the sympathy or coöperation of his audience.

Before the invention of printing, almost the only way to reach large numbers of people was through speeches. An orator might by his eloquence sway the emotions and sentiments of a crowd and make himself their virtual leader; in fact, many a demagogue owed his power to an ability to speak movingly. But with the spread of the newspaper and other periodical literature, oratory began to lose much of its influence. It is a very rare thing to-day for crowds to be swayed or turned from their purpose by one man's voice, and it is acknowledged that political speeches during a campaign change few votes. When a man rises in Parliament or in Congress to address his colleagues he has in mind the effect which the newspaper version of his speech will have on his supporters fully as much as the more immediate influence he may have on those who are listening to him.

One of the most effective orations ever written is the one which Shakespeare put into the mouth of Antony in *Julius Caesar,* and every step in his method of gripping the feelings of the crowd and bringing them to his own way of thinking is clear; but a present-day audience, with its beliefs strengthened by able editorials, or by mere constant iteration in a newspaper or other periodical, would be far less easy to sway.

Perhaps the earliest form of oration was the address of a commander to his soldiers. The ancient historians give examples of such speeches, and while the words which they give are probably not authentic, they at least prove the existence of this early type of oratory. Next came pleas before courts, where the man on trial and his accuser might each present his own cause, and growing out of this, the custom of choosing men with special gifts as speakers to make such pleas instead of those directly interested. Later, with the beginning of representative government, orators began to present the demands of the people in the assemblies, or urge the people to stand for their rights or to be true to their convictions.

In the history of oratory there have been three great periods which stand out above all others. The first of these, and in some ways the greatest, was the age of Demosthenes in Greece. The one figure so dominates his time that his rivals and imitators are often scarcely considered, yet Isocrates, Lysias, Aeschines and Pericles were orators who have seldom been equaled. The second great period was the latter half of the eighteenth century in England,

when Pitt, Fox, Burke, Mansfield and Sheridan brought to bear on every public question an eloquence which seems scarcely less marvelous to those who to-day read their speeches than it did to the actual hearers of their spoken words. The years from 1765 to 1865 in the United States constitute the third great epoch in the history of oratory, for which the burning questions demanding debate were as much responsible as the genius of the statesmen. Patrick Henry, James Otis, Hamilton, John Quincy Adams and Richard Henry Lee stand preëminent in the Revolutionary period, while in the troubled days before the War of Secession Calhoun, Webster and Clay represented respectively the South, the North and the middle ground. As specific examples of orations of recent years which have been remarkably effective, there may be mentioned the eloquent speech of Ingersoll in nominating Blaine for Presidential candidate in 1876, in which the latter was referred to as "the plumed knight," and that of Bryan, popularly known as the "cross of gold" speech, which won him the nomination for the Presidency in 1896. The greatest short oration ever delivered, and possibly the most powerful of any length, was Lincoln's immortal Gettysburg Address (see GETTYSBURG, subhead *The Gettysburg Address*, page 2485).

There have been other men at other stages in the world's history fitted to rank with these. Cicero held Rome spellbound; Peter the Hermit inspired thousands to set out on the Crusades; and even in the present day crowds flock to listen to forceful speakers. The orator is still in a way a power, but it is doubtful whether the day will ever return when he will exercise his old-time sway over people's minds.

Consult Powers' *Making of an Orator;* Kline's *Analysis of Oratorical Style.*

Related Subjects. There are men besides the following who have attained distinction as public speakers, but these are especially noted orators:

Aeschines	Fox, Charles J.
Bryan, William J.	Hayne, Robert Young
Burke, Edmund	Henry, Patrick
Calhoun, John C.	Isocrates
Cicero, Marcus Tullius	Otis, James
Clay, Henry	Pericles
Demosthenes	Pitt, William
Depew, Chauncey M.	Sheridan, Richard B.
Douglass, Frederick	Webster, Daniel
Everett, Edward	Yancey, William L.

ORATORIO, *ahr a toh' ri o,* a sacred musical composition, which requires soloists, chorus and full orchestra for its performance, without the theatrical necessities of scenery, costumes and acting. The subjects are generally taken from Scripture. It is named from the oratory or mission hall in Rome, where from 1571-1594 sacred musical performances were held, which developed later into the modern oratorio. The first and most universal subject was the *Passion,* of which Bach's *Passion according to Saint Matthew* is the most famous. The next phase of the oratorio is the Epic, of which Handel was the greatest exponent. He composed fifteen grand oratorios, of which the *Messiah* and *Israel in Egypt* are the most famous. Then followed Haydn's *Creation* and the *Seasons* and Mendelssohn's masterpieces, *Elijah* and *Saint Paul.* Modern oratorios are characterized by a strong dramatic element. Notable examples are Dvorak's *Saint Ludmila,* Liszt's *Saint Elizabeth* and *Christus,* Sullivan's *Golden Legend* and Mackenzie's *Dream of Jubal.*

Consult Patterson's *The Story of Oratorio;* Upton's *The Standard Oratorios.*

ORCHESTRA, *awr' kes tra,* a term used during the ages in several senses, all relating to music. It was originally the space in theaters between the audience and the stage. The Greeks appropriated this section to the chorus and musicians; the Romans reserved it as seating space for the Senators. In modern theaters the space is given over to musicians. The word has also come to be applied to the part of concert rooms assigned to the vocal and instrumental performers; to the instrumental performers, collectively taken, and to the whole body of instruments upon which the latter play. In the last sense, the modern orchestra consists of stringed, wind and percussion instruments, in varied proportions, according to the number of performers—the number varying from eight to over a hundred, with as many as twenty different instruments represented. (See illustration on next page.)

Haydn has been called the father of modern orchestral writing. Mozart's compositions are perfect studies in charm of orchestral shading. Beethoven has never been surpassed for the wonderful effects he put into his orchestral works. The tendency of the modern orchestra is to produce an effect by the liberal use of cymbals, bells, the big drum, etc., which sometimes, if not well modulated, destroy the harmonious effect of the more delicate instruments.

Related Subjects. A list of the articles in these volumes which treat of the musical instruments used in an orchestra is given under the title MUSICAL INSTRUMENTS.

HEARD IN THE ORCHESTRA

Violin

Violoncello

Double Bass

Bassoon

Bass Clarinet

Bass Bassoon

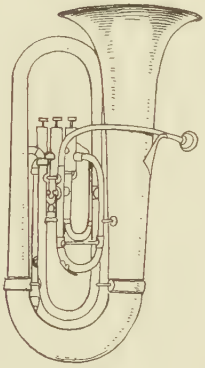
Clarinet

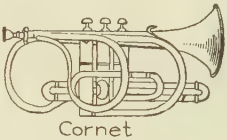
Oboe

Flute

Piccolo

Trombone


Tuba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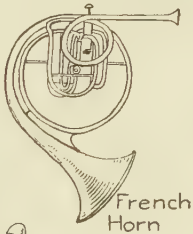
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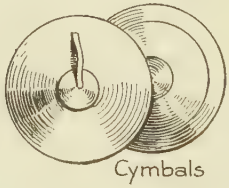
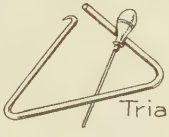

Cymbals

Snare Drum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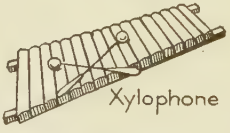
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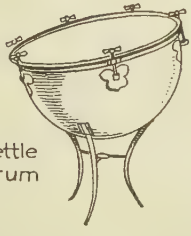
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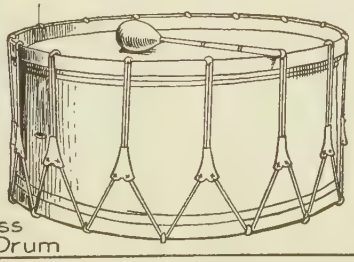
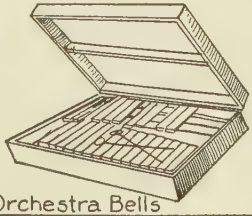

Bass Drum


Orchestra Bells

ORCHID, *awr'kid,* a plant embracing several species of wonderfully complex flowers. The hothouse specimens of the group are among the most rare and expensive of cut flowers, valued for their color, form or fragrance. To this family of over 6,000 species belong not only the gorgeous specimens seen in conservatories and florists' shops, but also those delicate, dainty wild flowers of cool, damp woods and bogs of America—the white, yellow and purple lady's-slippers, the exquisite calopogons, the magenta-pink arethusae, the rare calypsos, and the fragrant pink moccasin flowers, which, as expressed by Sarah F. Davis in *Summer Song,*

> With their coy and dainty graces,
> Lure us to their hiding places.

From brown seeds as small as tiniest grains of dust spring many striking forms of orchids. One bears blossoms which look like butterflies; another looks like an elephant moth. An orchid found by early Spaniards was held in

THREE OF THE ORCHIDS

reverence because it suggested to them the Holy Dove which descended at the baptism of Christ.

Orchids of tropical countries are air plants. They attach themselves to the bark of trees and send roots into the air, from which they receive their nourishment. Orchids of temperate regions grow from bulbs in the ground. Cultivated species of the greenhouses are chiefly from tropical America, India and Australia. Lovers of orchids have made wonderful collections of rare specimens brought from out-of-the-way corners of the globe, and many of these rare growths are very expensive.

All orchid blossoms are of extremely irregular shape, and are constructed for fertilization by insects. There are three sepals and three petals, all beautifully colored. One petal is always developed in a remarkable manner, and is called the *lip.* In some species it is a long, narrow strip; in others, a broad fringed surface, and in still others, a pouch or sac. This lip is especially marked to guide visiting insects to the nectar within. Before the honey can be reached, however, the insect must brush against pollen masses and either rub the pollen-dust against a sticky pistil before leaving, or carry with it a bundle or two of pollen to be left on the pistil of the next orchid blossom it visits. Each species has a contrivance for fertilization especially adapted in size and shape to one kind of insect, and the various devices are a never-ending source of wonder.

One species of orchid furnishes the vanilla of commerce. The tubers of other kinds are dried for the nutritive starch they contain and appear on the market as salep, which is used medicinally. M.S.

Consult Curtis's *Orchids for Everyone;* Bugg's *Orchids.*

Related Subjects. The reader is referred to the following articles in these volumes:

Air Plants	Holy Spirit Plant
Cross-Fertilization	Vanilla

ORDEAL AND COMBAT, Trial by. In a primitive stage of culture it is assumed that supernatural power will intervene to protect the innocent and punish the guilty. This belief survives into higher stages of culture and is found in the jurisprudence of the Middle Ages. In England the trial by "Judgment of God," known as the *Ordeal,* was a recognized mode of procedure. As late as the reign of King John (1199-1216) bishops and clergy were directed to use the ordeal by "iron, water and fire," which was always surrounded by all the solemnities the Church could employ. The *ordeal by fire* was performed by taking in the hand a piece of red-hot iron from one to three pounds in weight. If the suspected person was unharmed, he was declared innocent; if injured, he was deemed guilty. In another form the accused walked barefoot and blindfold over nine red-hot plowshares.

Strange as it may seem, official records of such trials in the thirteenth century show the acquittals and the convictions were about equal, the acquittals being due, it may be assumed, to some fraud in the arrangements for the ordeal. In the *ordeal by water,* the accused plunged his bare arm to the elbow in boiling water, his innocence being established if he escaped unharmed. Another method was to bind the prisoner securely and throw him into deep water. If he sank, he was declared innocent. This was, however, a comparatively safe

ordeal, since there were ropes attached with which to pull him to safety if he sank.

Trials by ordeal were naturally opposed by the intelligent, and the decrees of Pope Innocent III in 1215 and Honorius in 1222 suppressed them in the Church. In England, the Instructions of Henry III issued in 1219 forbade them; and in Germany, the decree of Frederick II suppressed them. Certain forms of trial by ordeal still exist, notably among the Hindus and some tribes in Africa.

Trial by Combat. This form of trial, differing from an ordinary fight or duel in that divine intervention on behalf of the righteous was expected, became common in England after the suppression of ordeals by Henry III. It was not legally abolished till 1818, though its use had quietly ceased long before. The general procedure was for the accused to combat the accuser; if a dog trailed an offender by scent he was considered the accuser and the man was obliged to fight him. A lord could appoint a retainer to fight in his place, and women and priests were usually represented by others. The story of *Lohengrin* hinges on the custom of trial by combat.

ORDER, a term used in botany and zoölogy in the classification of plants and animals to embrace genera (plural of *genus*) which resemble each other in structure. It is a division below the *class* but above *family,* although in botany the terms *order* and *family* are often interchangeable. The subject is discussed in greater detail in the article CLASSIFICATION.

ORDERS, RELIGIOUS. See MONASTICISM; BENEDICTINES; DOMINICANS; FRANCISCANS.

ORDERS IN COUNCIL, decrees issued by the English Crown, so-called because they are proclaimed with the advice of the Privy Council. In January, 1807, after the promulgation of Napoleon's Berlin Decree, declaring the British Isles to be in a state of blockade, England retaliated with an Order in Council which forbade neutral vessels to trade from port to port within France or any country allied with it. Later in the same year a second Order in Council was issued extending this blockade. The issuance and enforcement of these orders contributed in a large degree to bringing on the War of 1812 (which see). In 1914, after the outbreak of the War of the Nations, England issued an Order in Council declaring the North Sea a war zone. In retaliation for this blockade of German ports Germany carried on its extensive and disastrous submarine campaign.

ORDINANCE, *awr'di nans,* **OF 1787,** an ordinance or statute adopted by Congress, July 13, 1787, which was one of the most important legislative acts in American history. It provided a plan for the government of the territory which was ceded to the United States by New York, Massachusetts, Connecticut and Virginia, and comprised the country northwest of the Ohio River, known as the Northwest Territory. A governor, secretary and three judges, appointed by Congress, were the first officials, and to them was given authority to apply to their Territory any law then in force in any of the thirteen states. The territory was from time to time to be divided; when any division should have a population of 60,000 it might become a state, if certain conditions imposed in the Ordinance were compiled with. Not more than five nor fewer than three states might be formed; the latter number were eventually organized—Ohio, Indiana, Illinois, Michigan and Wisconsin. The Ordinance forever forbade slavery in that region, gave freedom of worship to all, and provided for schools, in a clause which has become famous in the educational history of the United States:

> Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

For the story of the development of the region affected, see NORTHWEST TERRITORY.

ORDNANCE, *awrd'nans.* See CANNON; ARTILLERY.

ORDOVICIAN, *awr doh vish'an,* PERIOD, a division of the Paleozoic Era of geologic time, extending from the Cambrian Period to the Silurian. Formerly it was known as the *Lower Silurian.* During the period nearly all of North America was under the sea; however, the great inland sea covering the region of the prairies and great plains was shallow. Most of the rocks of the period were formed by the deposit of sediment which afterwards hardened into rock. Some of these remain in their original form, but others have been greatly changed. To illustrate, the extensive deposits of marble in the Green Mountains were originally Ordovician limestone, which was later changed to marble by heat. Trenton limestone, Saint Peter's sandstone and magnesian limestone were among the rocks formed. Extensive deposits of petroleum and natural gas come from Ordovician rocks, and the lead and zinc found in Iowa, Illinois and Wisconsin were deposited during the period.

The sea abounded in shellfish, corals and crinoids (sea lilies). The first insects appeared during the period, and in Colorado, fossils of what is believed to be the first animal with a backbone (vertebrate) have been found.

Related Subjects. The reader is referred to the following articles in these volumes:

Cambrian Period
Fossil
Geology (particularly the illustration, page 2439)
Paleozoic Era
Silurian Period

OREGON, one of the Pacific coast states of the American Union, a state of great forests and fisheries, early brought into prominence for the important part it bore in the international controversy over the northwest boundary of the United States. It was originally the home of the Beaver tribe of Athabaskan Indians, and is popularly known as the BEAVER STATE. Its flower emblem is the Oregon grape.

Size and Location. Most of Oregon's northern boundary with Washington borders the Columbia, the great historic river of the Northwest. The greater part of the eastern boundary with Idaho follows the rapid waters of the Snake River. To the west lies the Pacific Ocean and on the south are California and Nevada. Having an area of 96,699 square miles, 1,092 square miles of which are water, it is about twice the area of Louisiana and is nearly square, being only 100 miles wider from east to west than it is from north to south.

The People. Oregon's population is not yet large enough to develop the rich and varied resources of the state, but the number of inhabitants is steadily increasing. Although it is among the largest states of the Union in area, being ninth in size, in 1920 it was thirty-fourth in population. The number of inhabitants was then 783,389, of whom one-seventh were of foreign birth, chiefly German and Canadian; 7,241 were Chinese and Japanese; 4,590 were Indians. The number of negroes is very small, due to the "antinegro" clause in the state constitution withholding from them the right to own land. In 1920 the population averaged 8.2 per square mile, but the ratio is now considerably higher. On January 1, 1910, the population was 672,765; of these nearly one-third of the number (258,288 people) lived in Portland, the great commercial center of the state. The only other cities having over 10,000 inhabitants are Salem, the capital, Astoria, Eugene and Medford.

The Indians are confined to Klamath, Umatilla and Warm Springs reservations. Oregon's native white inhabitants are largely immigrants from Iowa, Missouri, Illinois and other Middle Western states. The delightful climate and rich farm lands of the coast in recent years have attracted many Eastern and Middle Western people of education and culture.

The most important religious bodies of the state are the Roman Catholic, Methodist, Baptist, Presbyterian, Disciples of Christ, Lutheran and Congregational, ranking in the order named.

Education. Oregon is among the most progressive states of the Union in its educational system and administration. In 1914 the Beaver State led all others in the number of teachers employed and the expenditure for education in proportion to the population. The general excellence of the system is shown in the state's low percentage of illiteracy, which, being only 1.9 per cent in 1910, was less than that of any state in the Union excepting Iowa and Nebraska, the latter state having the same percentage. At the head of the school system is the state superintendent of public instruction and the state board of education. In rural schools, an unusually high standard is maintained. Instruction is given in industrial arts and sciences in both country and city schools.

There is a compulsory education law, and over sixty per cent of the total number of persons of school age are enroled in the public schools. The expenditure of the state for education is over $5,000,000 yearly. The school fund is derived from the sale of public lands. In 1915 an act of the state legislature became effective

requiring all teachers receiving certificates to have at least six months' teaching experience, or a certain amount of professional training.

Schools of higher education supported by the state are the state university at Eugene; an agricultural college at Corvallis, and a normal college at Monmouth. These schools are co-educational, as are the most important private institutions, such as Albany College at Albany (Presbyterian); Columbia University at Portland (Roman Catholic); McMinnville College at McMinnville (Baptist); Pacific College at Newberg (Friends); Pacific University at Forest Grove (Congregational); Reed Institute at Portland; and Willamette College at Salem (Methodist).

Institutions of charity and correction, including a state hospital, sanitarium, tuberculosis hospital, training and industrial schools, institutions for the deaf, blind and feeble-minded, at Salem, the East Oregon State Hospital, at Pendleton, and a soldier's home at Roseburg are controlled by a state board created in 1913, consisting of the governor, secretary of state and state treasurer. The state penitentiary at Salem is not under this board; in it the honor system is in force, and the governor is an inspector of the institution.

The Land. The Cascade Mountains, crossing the state from north to south, separate it into two distinct sections having widely differing characteristics. Western Oregon, occupying about one-third of the state, is remarkable for its rich and varied resources. Between the Coast Range, extending along the Pacific and the Cascade foothills lies the Willamette Valley, the chief center of Oregon's agricultural wealth. It covers over 5,000,000 acres of most fertile soil, and is given to diversified farming. The western slopes of the Siskiyou and Coast mountains, which do not rise above 4,000 feet, fall gradually to the sea, where their spurs form numerous promontories on the otherwise regular coast. From their eastern slopes, this western section presents a variegated panorama of towns, meadows, streams, orchards, gardens, groves of evergreen and clumps of forest, and in the background, the lofty, glittering summits of the snow-capped Cascade Mountains. Mount Hood, rising abruptly from the banks of the Columbia to an elevation of 11,225 feet, is the highest of these peaks, and is the highest point in the state. Mount Jefferson, Mount Pitt, Bachelor, Diamond and the Three Sisters mountains are other prominent peaks of the Cascade Range.

The principal rivers of this section are the great Columbia in the north, the Willamette, rising in the Cascades and flowing northwest and north to the Columbia, and the swift Rogue, Umpqua and Coquille rivers, which cut their way through the Coast Range to the sea. At the mouths of these coast rivers are wide, land-locked harbors, the greatest of which is Columbia Bay, others being Coos, Tillamook, Nestucca, Siletz, Yaquina and Winchester bays.

The section east of the Cascades is a high inland plateau, a sweeping expanse of arid plains, covered with dusty sagebrush, broken by buttes (see BUTTE), patches of ranch land and ribbons of brighter green along a few streams and irrigation ditches, and shut in on the northeast by the rock walls of the Blue and Wallowa Mountains, which have an elevation of about 7,000 feet. Southeast of the Great Sandy Desert, which lies in the central part of the plateau, Steins Mountains rise to an altitude of about 9,000 feet.

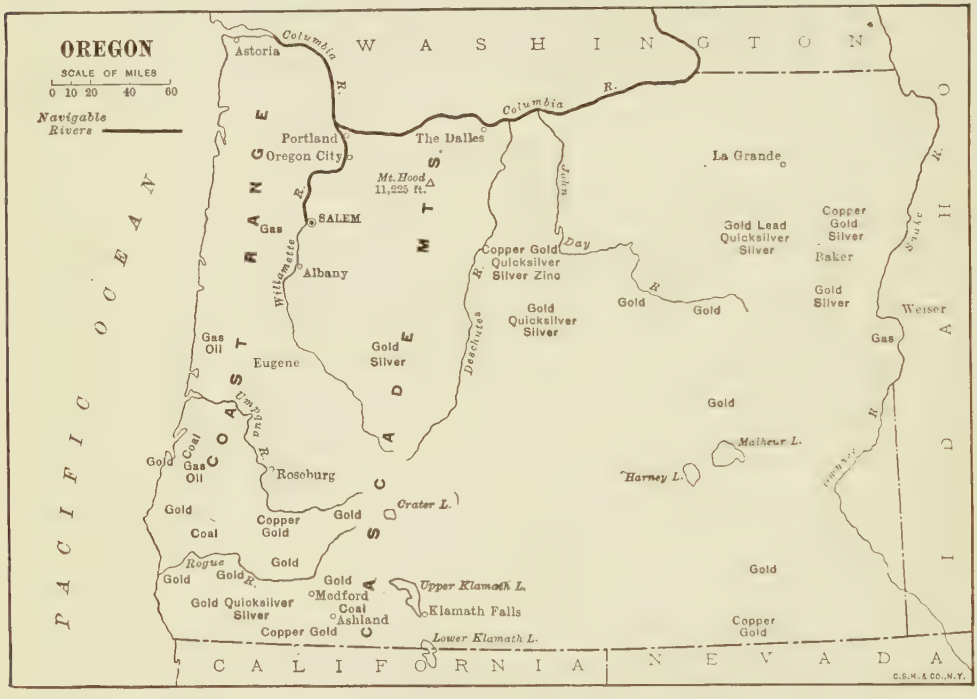
The Snake River and its tributaries drain the extreme eastern region. The Deschutes, fed by the Cascades, flows down their east slopes and two-thirds of the length of the state, emptying into the Columbia. The John Day River, another tributary of the Columbia, drains much of the northern part of this section. The small streams of the plateau flow into shallow, salty lakes which in the dry season evaporate, leaving hard mud beds and alkali flats. Most of the lakes are in the south-central part of the state, and with the exception of Crater and Klamath lakes and a few small mountain lakes in the Cascades, they are brackish and shallow.

Scenery. The Columbia, cutting deep gorges through the heart of the snow-crowned Cascade Mountains, presents a panorama of magnificent beauty. Oneonta Gorge, La Tourelle, No Wonder, Horse Tail and Multnomah falls are famous for their beautiful cliff scenery. At Bridal Veil Falls a broad stream descends hundreds of feet in a showery spray, pauses in a whirling pool, then plunges to the river below. At the entrance to the Cascades the most beautiful gorge is found. The immense craggy peaks of the mountains jut out into the stream, forming palisades of surpassing beauty. Cape Horn and Rooster Rock, two great cone-shaped basalt pillars, form the gateway of the gorge where the river makes a descent of about 300 feet through a canyon six miles long and almost a mile deep. Mount Hood, its summit in the clouds, towers on one side, and on the Washington bank rise fir-clad Mount Adams and

Saint Helens. Cascades spring from every crevice; the river foams over boulders and then broadens into a placid stream. At Castle Rock in Morrow County there is another beautiful gorge, and above this point the river channel becomes narrow and tortuous.

The Snake River canyon in the Blue Mountains, 2,000 to 5,000 feet deep, where the river flows between steep black walls and fantastic basalt pillars, their grotesque shapes being caused by erosion, rivals the Canyon of the

In the eastern section, cut off from sea winds by the Cascades, extremes of temperature occur in winter and summer, and there is also a great daily range, due to the high elevation. Frosts have been known to occur every month during the year. This section of the state is dry, the annual rainfall being only from eight to twenty-two inches. In the Cascades the amount of rainfall is greater, but is only one-third of that on the slopes of the Coast Range, where it ranges from 75 to 138 inches



OUTLINE MAP OF OREGON

Showing boundaries, navigable rivers, principal cities, location of mineral deposits, gas and oil, and the highest point of land in the state.

Colorado in weird beauty. Crater Lake, National Park, is another of the beauty spots of the state. The lake, which is in the sunken volcanic crater of Mount Mazama, is of wonderful clearness and great depth. It lies 6,239 feet above the sea and is surrounded by dense forests and mountain walls of rock. The Klamath Lakes are also noted for their scenery.

Climate. There are two distinctly different climates in Oregon, belonging to the contrasting sections of the state. West of the Cascade Mountains the climate is mild, moist and equable, much like that of the British Isles. The winters are mild and humid, and the summers, because of the trade winds, are cool and cloudless.

a year. The average temperature of the state for January is 39° F. and for July 66° F.

Agriculture. The improved land in farms is over 4,300,000 acres, or about one-fifteenth of the total land area. The greatest proportion of land used for agriculture is in the northern third of the state and in the counties of the western section. East of the Cascades irrigation is generally necessary. In some districts there are late frosts; other sections contain alkali deserts wholly without vegetation, and still others are suitable only for grazing. The most valuable farm land is in the Willamette Valley, where every crop of the temperate zone can be raised. This fertile valley and those of the Rogue and Hood rivers are famous for the

production of fruit, especially apples, which are sold in great quantities in London and New York markets. The value of the apple crop is usually about $3,000,000 a year. Oregon pears, which are of an especially fine variety, peaches, nectarines, prunes, cherries and grapes are grown in abundance. The small fruits, of which the strawberry is most important, form another large crop. All kinds of vegetables are grown.

Cereals, hay, potatoes and hops are the most important agricultural products of the state. Oregon is the source of about forty-seven per cent of the total hop crop of the United States; in 1915 the production was nearly 100,000 bales. Winter wheat, oats, spring wheat and barley, the chief cereals, have a total annual value of about $25,000,000, two-thirds of which is the income from wheat. In 1915, at the Panama-Pacific Exposition, the grand prize for forage crops was awarded to Oregon. The value of the live stock of the state is about $75,000,000, one-third of which is the value of horses, and another third, the value of cattle. The farmers of the Willamette Valley are prosperous and progressive, but in the arid plateau region much of the land is yet owned by great syndicates and is rented to tenants. Oregon is one of the ten states in which the government still has large tracts of public lands to dispose of.

Irrigation is doing much to conquer the sagebrush of the arid regions and is decreasing the number of extensive cattle ranches. Six per cent of the total area of farm land, or about 686,000 acres, was under irrigation in 1921, most of it in the south and east districts. Work has been begun on projects for the watering of several hundred thousand acres, most of which is included in contracts with the Federal government. Government projects include the Umatilla and Oregon Klamath systems, the investment in these in 1915 being over $5,000,000.

Forests. Oregon is one of the leading states in the extent and value of its forests; the state possesses one-sixth of the standing timber of the United States. The Douglas fir, known as the Oregon pine, or red fir, is the most important timber of the state. This tree, growing 300 feet tall and having a diameter of about fifteen feet, produces more commercial timber per acre than any other tree of the American continent. Next to yellow pine, it is the most extensively used of the woods in the United States, and the largest part of the total annual output of over 5,000,000,000 board feet is from Oregon. The Sitka spruce, twenty feet in diameter, is the largest tree of the state and is also important commercially. The western yellow pine, white pine, sugar pine, hemlock, cedar, juniper, laurel, willow, oak, maple and ash are also abundant. Oregon, furnishing 33 per cent of the product of Douglas fir, ranks ninth among the states in the total output of timber.

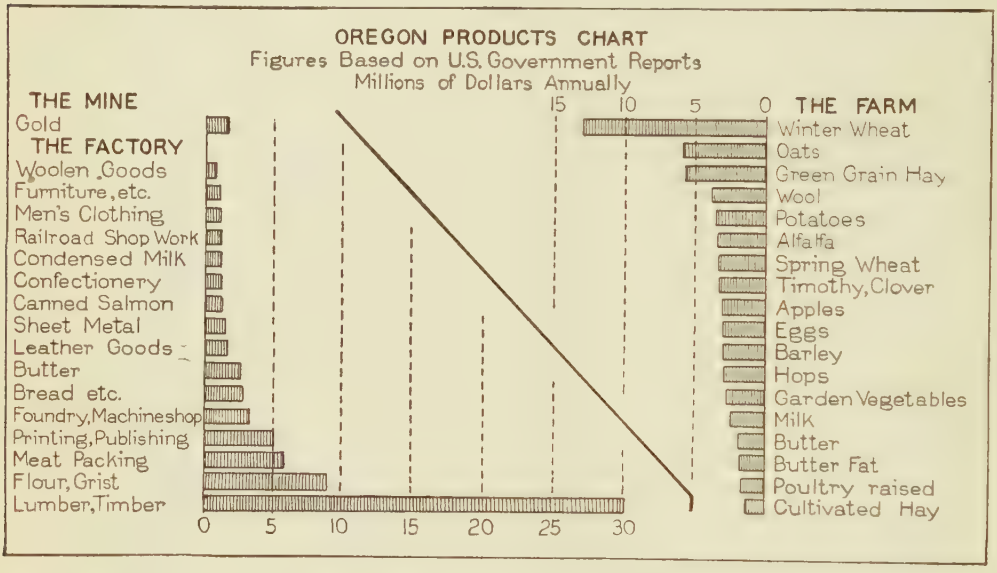
Only Idaho and Montana surpass Oregon in the amount of lumber cut from national forests, which cover 13,259,992 acres in this state. In 1915 Congress passed acts prohibiting any additions by the President to the national forests of Oregon and six other Western states. The Federal government coöperates with the state in protecting private and state-owned land against forest fires, and in the national forests trails have been made and telegraphs constructed to secure aid in fighting fires. The state board of forestry organizes other methods of forest protection.

Mining. Although its mineral resources are varied, Oregon is not important as a mining state. Baker County, in the Blue Mountains, is the most active center of the mining industry, and is the chief source of gold, silver and quartz. Josephine and Lane counties, in the west, also produce gold; placer mining, begun in 1849, is still a thriving industry. Clay products, chiefly common brick, are important. Coal is almost entirely confined to Coos County, the output of the state in 1920 being only 30,000 tons. Copper, platinum, occasional gems, lead, sand, gravel, limestone, gypsum and mineral waters are widely distributed. The value of the annual mineral products of the state is about $2,000,000.

Fisheries. Ranking sixteenth among the states in the value of its fisheries, Oregon owes its importance as a fishing state to the great supply of salmon from the Columbia River. Astoria is the chief center of the catching and canning of salmon, which is the most important fish of North America. In 1921 the salmon pack of the Columbia River was 291,240 cases, valued at over $2,000,000, being exceeded only by the Alaskan, Puget Sound and British Columbian packs. Immense halibut "banks" line the coasts, and white sturgeon, oysters and "Oregon" trout are caught in large quantities. Almost all of the fishing is done from small boats near the shore or along the banks of streams.

Manufactures. The large amount of available water power, the abundance of raw ma-

terials furnished by the forests, farms, fisheries and mines, the improvement of rivers and the extension of railroads are developing Oregon's manufacturing industries. By far the most important of these is the milling and manufacturing of timber products, the largest being located at Portland and Astoria in the Columbia basin and at Eugene and Springfield in the Willamette Valley. The canning and preserving of fish and fruits is another leading industry. Flour and grist milling, slaughtering, printing and publishing, car construction and repairs, foundry work and the manufacture of woolen goods are important. Nearly 59,000 persons were employed in factories in 1920, and the value of manufactured goods was almost $366,800,000, Oregon ranking thirty-third among the states. Half of the manufacturing is done in Portland.

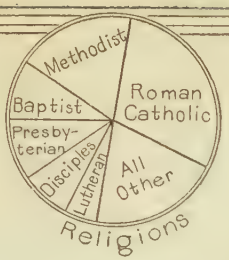


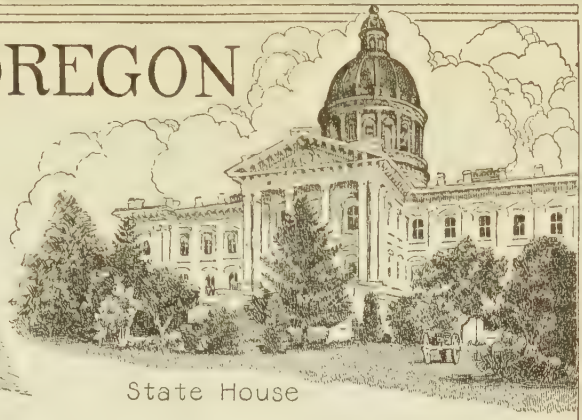
Transportation. Facilities for water transportation are extensive in Oregon. Ocean-going vessels navigate the Columbia as far as Portland, and river steamers go as far as Lewiston, Ida., passing through the Cascades by means of locks and around the Dalles of the Columbia by means of the Celilo Canal, which was opened to navigation in 1915. The Snake River is navigable north of the Oregon boundary. The water traffic of the interior of the state is carried by the Deschutes and Willamette rivers, the latter being navigable from Portland to Eugene, a distance of 150 miles. In 1916 there were 2,136 miles of navigable waterway in the state. There are steamship lines to San Francisco and other coast points, and much trade is carried on with the Orient. The value of the imports and exports of Portland are yearly on the increase.

The west section of the state is well supplied with railroads, but the region east of the Cascades, except in the Deschutes Valley and the northeast corner of the state, is practically without railroad accommodations. The Oregon-Washington Railroad & Navigation Lines (Union Pacific system) extend the entire length of the Columbia River west of Portland, and the Spokane, Portland & Seattle road east of Portland. The Southern Pacific's main line is west of the Cascades, extending south into California. The great undeveloped east-central section has recently been entered by two rival lines in the Deschutes Valley, the Oregon Trunk, of the Hill system, and a branch of the Oregon-Washington. The Hill main line to Portland from the west runs along the north side of the Columbia in Washington; it serves both the Northern Pacific and Great Northern. There are 3,500 miles of steam railroad and over 700 miles of electric road in the state. Public utilities are regulated by a commission.

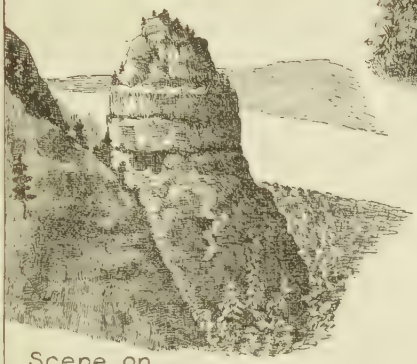
In 1913 a state highway commission was created; since then over $10,000,000 have been expended upon the improvement of county roads and bridges, and over $2,000,000 upon the betterment of state roads. In 1915 the Columbia Highway, a magnificent automobile drive 200 miles long, crossing the Cascades at the foot of Mount Hood, was opened.

OREGON

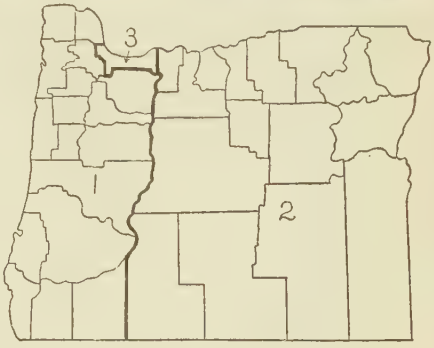




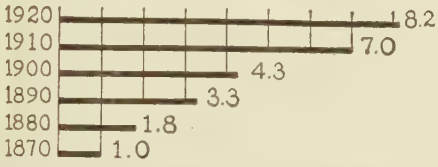
State House



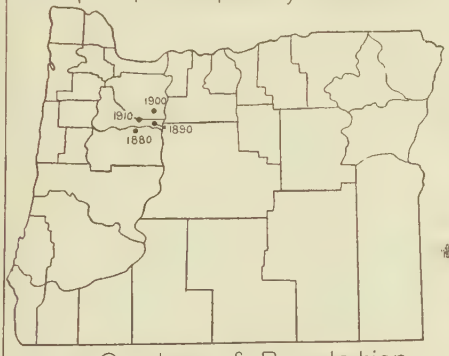
Scene on the Columbia River



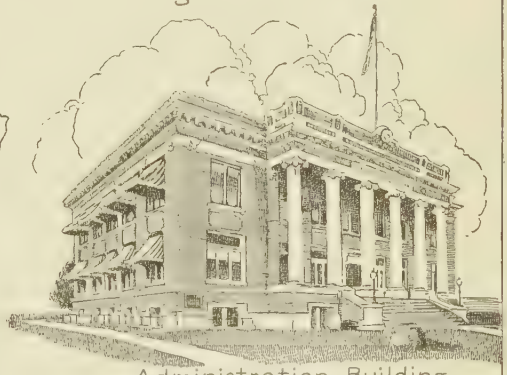
Congressional Districts



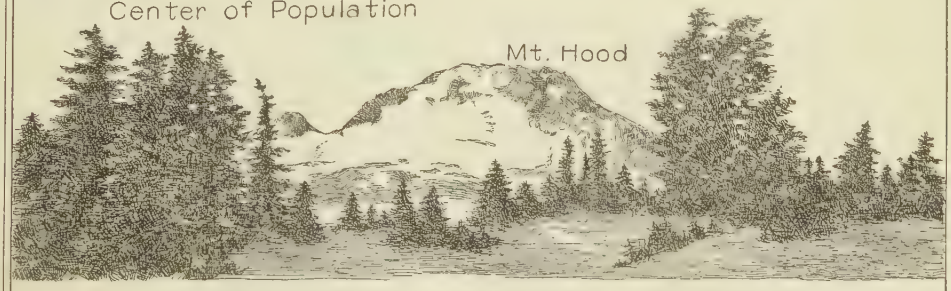
People per Sq. Mi. by Decades



Center of Population



Administration Building, University of Oregon



Mt. Hood

Government and History

Government. Oregon is one of the most democratic commonwealths of the American Union. All citizens, male and female, have suffrage, but since 1916 foreigners who have taken out only their first naturalization papers cannot vote. They must now be full citizens before they can cast their ballots. The initiative and referendum have been in force since 1903; all officials of the state are subject to recall. In 1901, years before the passage of the amendment for direct election of United States Senators, Oregon began to nominate those officials by direct primaries. The present and original constitution of the state went into effect February 14, 1859. Amendments may be proposed in either house or by the people, and must be accepted by both houses and the voters before becoming part of the constitution. Constitutional conventions may be called only with the approval of the regular voters.

The legislature consists of a senate of thirty members, elected for four years, and a house of representatives of sixty members, elected for two years. Sessions are held biennially, on the second Monday of January.

The executive power is vested in a governor, secretary of state and state treasurer, elected for four years. The governor may serve only two terms in twelve years, and the secretary of state and state treasurer are not eligible for immediate reëlection.

The judiciary consists of a supreme court, comprising one chief justice and six associate judges, elected for six years; circuit courts, each having one judge, who holds sessions twice yearly in each county; county or probate courts, having one judge elected for six years; and justices of the peace. The law provides that the most able and permanent citizens of the district shall serve as jurors, and that civil verdicts may be rendered by three-fourths of the jury.

Local administration is by counties. Municipalities also exercise the power of initiative and referendum. Campaign expenses are limited by a corrupt-practice act. Workmen's compensation laws have been passed, and laws regulating the employment of women and children are made by an industrial welfare commission.

Exploration and Early Settlement. In the sixteenth century English and Spanish navigators, seeking a northwest passage, explored the coast of Oregon. In 1774 it was taken formal possession of by Juan Perez, a Spaniard, and in 1778 Captain Cook explored Nootka Sound. In the eighteenth century the great river of the Northwest was mentioned by Jonathan Carver in a history of travels and was called the "Oregon," this name being later given to the territory which it drained. Robert Gray, an American trader, finally discovered, in 1791, the long-sought "Oregon" and renamed it the Columbia. Thus it is the Columbia to which Bryant refers in *Thanatopsis,* when he speaks of—

> . . . . the continuous woods
> Where rolls the Oregon, and hears no sound,
> Save his own dashings.

Hudson's Bay traders established posts along the river and started to trade with the Orient. In 1809 the Northwest Company, a British organization, began trade on the Fraser River in British Columbia, and in 1811 Astoria and other posts were founded by the Pacific Fur Company, under John Jacob Astor. It was here that the great fortunes of the Astor family were created.

The "Oregon Question." During the War of 1812 the British took possession of Astoria and renamed it Fort George. After the restoration of peace, by the Treaty of Ghent, the dispute over the northwest boundary arose, involving the "Oregon Question." The treaty provided for the return of all territory taken during the war. The British surrendered Astoria, and both countries agreed to a joint occupation of all the Northwest Territory. Through the Louisiana Purchase and Gray's discovery of the Columbia the Americans laid claim to all of the territory between 42° and 54° 40′ N. latitude, and began the settlement of the Columbia Valley.

In 1834 Jason Lee, a Methodist missionary from Missouri, established missions in the Willamette Valley. He was followed by others, notably Henry Spalding and Marcus Whitman (which see). In 1838 one hundred and fifty people went to Oregon from Missouri by way of Cape Horn. The population was again increased by the "Great Immigration" of 1843, when about nine hundred people assembled at Independence, Mo., and crossed the plains by wagon train, opening the famous "Oregon Trail."

The provisional government which had been established in 1841 came into conflict with the Hudson's Bay Company, and the boundary question again arose. In the national Democratic convention of 1844, which declared the

RESEARCH QUESTIONS ON OREGON

(An Outline suitable for Oregon will be found with the article "State.")

Where is the deepest lake in the United States, and how was it formed? How high above sea level is it?

What does the name *Oregon* mean, and why was it given to this state?

When was "fifty-four forty or fight" a popular slogan, and what did it mean? How was the question to which it referred finally settled?

Give two popular names or nicknames of this state, and account for both of them.

Where is there a "soap lake," and why is it so called?

How many states of the Union does Oregon touch? How does it compare in size with each of the states upon which it borders?

How many states are larger? How many of these have a larger population?

On how many sides has this state, in part at least, a water boundary?

Why has the state such a very small proportion of negro inhabitants?

How did the state compare in 1910 as to density of population with the states upon which it borders? With the country as a whole?

How many cities of the United States have a population larger than that of Oregon in 1910? Larger than that in 1915? (See list in article CITY.)

How many cities in the United States are larger than the largest city of this state? How many in Canada?

What is the highest point in the state? How does this peak compare in altitude with the loftiest points in the bordering states? In Colorado? In Wyoming?

What do Oregon's shallow lakes look like in the summer time?

What can you tell, from the description of the Bridal Veil Falls here given, as to the reason for their being so named?

Why is the climate of the eastern districts so different from that of the western? What effect does this have on the methods of agriculture followed in the two regions?

Of what crop does this state produce almost half of the total output for the United States? What is this crop chiefly used for?

What proportion of the standing timber of the United States is found in Oregon? What is the most important timber tree? What is the largest?

How many states have a larger timber output?

How many acres do the national forests of Oregon cover? Why is it not likely that this area will be increased?

How does the income from all the mines of the state compare with the total annual value of the apples raised?

Which are the more important, sea fisheries or river fisheries?

Show how many of Oregon's manufacturing industries depend upon the natural resources and the other industries of the state.

What has been done to improve the roads of the state?

What legislative enactments prove the progressive character of the state?

Who can vote in Oregon?

What stand has the state taken on the liquor question?

What great river appears in a famous poem under a name which it does not now bear?

What city is named after a family which won a fortune in these Western regions?

How did this territory come into the possession of the United States?

What was the "Great Immigration" of 1843?

United States had unquestionable right to the whole territory of the Northwest, the Democrats adopted as their slogan "Fifty-four forty or fight." President Polk in the next year laid claim to the territory, but in 1846 a treaty was signed with England fixing the present northwest boundary of the United States (parallel 49°) as the northern boundary of the Oregon country.

Serious Indian attacks required better protection for the settlers; therefore in 1848 Oregon was organized as a territory, including the present states of Oregon, Washington, Idaho and parts of Wyoming and Montana. Oregon was reduced in size in 1853, when Washington was made a territory.

Statehood. In 1859 Oregon was admitted as a state, with its present boundaries. Indian attacks and massacres, begun in 1846, were continued during the War of Secession, and the state volunteers remained at home to suppress these outbreaks. The most serious uprisings were the Modoc War (1864-1873), and the Shoshoni War (1866-1868).

Many internal improvements were made by the state before the twentieth century. At the time the Cascade Locks were completed, in 1896, they were the largest in the world. There has been a close contest between the two great political parties of the state, the Republican generally being the stronger. In 1912, the Democrat, Wilson, received the plurality of votes, but in 1916 the state gave the Republican, Hughes, a plurality. Woman suffrage was adopted in 1912. An amendment made in 1914 provided for the abolishing of capital punishment. A Sunday closing law was strongly enforced in 1916, only undertaking establishmetns, hotels and bakeries being allowed to open on the Sabbath. In 1921 a law empowered women to serve on juries. E.B.P.

Other Items of Interest. In the northwestern part of Oregon there is a strange lake—a "soap lake" the inhabitants call it. If the water be violently stirred or beaten with a stick, it forms a thick suds, and when rubbed between the hands it has a soapy feel. Animals refuse to drink the water.

During the rainy season the coast region of Oregon has such an excess of moisture that the state bears the humorous nickname of the "web-footed state."

One of the deepest lakes in the United States, if not the very deepest, is Crater Lake, in Klamath County. The cliffs that rise about it are so lofty and so steep that the water can be reached only at one point, and the lake itself is in some places about 2,000 feet deep.

The Japan Current has a noticeable effect, in tempering the winter climate of Western Oregon.

The name *Oregon* is of Indian origin, and means "River of the West."

Consult Putnam's *In the Oregon Country;* Johnson's *Short History of Oregon.*

Related Subjects. The following articles in these volumes contain much that will be found helpful and interesting in connection with a study of Oregon:

CITIES

Astoria	Portland
Eugene	Salem
Medford	

LEADING PRODUCTS

Apple	Lumber
Fish	Pear
Hay	Salmon
Hops	Wheat

MOUNTAINS

Cascade Range	Hood, Mount
Coast Range	

RIVERS

Columbia	Willamette
Snake	

OREGON, UNIVERSITY OF, a state institution founded at Eugene in 1872, comprising the final unit in the public school system of Oregon. The university is under the control of a board of regents of thirteen members, three of whom, the governor, the secretary of state and the superintendent of public instruction, are members of the state board of education. The university was opened in 1876 and is now organized into schools of literature, science and arts, commerce, education, law, journalism, music, architecture and fine arts, medicine, and a graduate school. The schools of law and of medicine are located at Portland. The university library contains about 66,000 volumes. There are about 125 instructors, and the student body numbers over 2,050.

O'RELL, MAX (1848-1903), the pen name of a French writer, PAUL BLOUET. He had a varied experience in the Franco-German War, as newspaper correspondent in England and as a school teacher before he began to write the books that made him known to the public. Journeys in the United States and in England gave him material for some of his books, such as *John Bull and His Island, Jonathan and His Continent, English Pharisees and French Crocodiles* and *John Bull and Co.* These were first published in French, and were translated into English by his wife. His style is bright, humor-

ous, sarcastic, and he often hits upon the truth with wonderful accuracy.

ORENBURG, *ar en boorK',* a well-built modern city of European Russia, capital of the government (province) of the same name, situated on the Ural River, at the southern end of the Ural Mountains. It is 988 miles southeast of Moscow, by rail. Before the Trans-Caspian Railroad was built Orenburg was an important center of the caravan trade with Central Asia, but since the construction of the railroad a large government slaughterhouse has been built, and the city now exports quantities of frozen meats, sausages, hams, tallow, hides, skins and dairy products. Among the features of interest are the arsenal, barracks, a seminary for priests and several other schools, and an old fortress. Population, 1910, 93,600.

ORESTES, *o res' teez,* in Greek mythology, the son of Agamemnon and Clytemnestra. When his father was slain by his guilty mother, Orestes, then a child, was saved by his sister Electra, who had him taken from the kingdom and placed in the court of his uncle. Here he became acquainted with Pylades, the son of the king, and the two grew up to be most intimate and faithful friends. His sister Electra had taught him that he should avenge the death of his father, and when finally he became of age, he started out to accomplish this, accompanied always by Pylades. They pretended to be messengers bearing in an urn the ashes of Orestes, who they said had died, and by this means obtained access to the palace and killed both Clytemnestra and Aegisthus, her lover. For this terrible crime, the killing of his own mother, the Furies pursued Orestes and drove him insane.

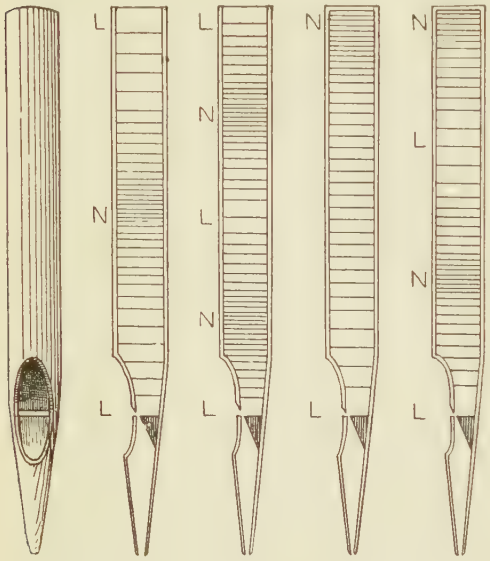
He wandered about, cared for by the faithful Pylades, till the oracles said that if he would bring from Tauris in Scythia a famous statue of Diana, he would be restored to reason. Pylades, then, with his dependent friend, started for Tauris, where the barbarous natives captured them and prepared to sacrifice them to Diana, as was their custom with strangers. The priestess of the temple was Iphigenia, a sister of Orestes, who had been carried away years before by Diana, and when brother and sister recognized each other, the safety of the captives was assured. With Iphigenia's assistance the statue was obtained and taken home by the three, and thereafter Orestes reigned in peace at Mycenae. See IPHIGENIA.

ORGAN, *awr' gan.* One writer has called the reeds down by the river "the first infantile lisp" of this king of musical instruments. Probably the earliest ancestor of the organ was the instrument which the ancient Greeks called Pan's pipes; it was made of several hollow tubes (reeds originally) of different lengths, the upper ends, across which the player blew, being left open. This was in use five centuries before Christ. About three centuries later Ctesibus of Alexandria made an instrument in which air was forced into the pipes by means of water power. There are now in the Museum of Naples two hydraulic organs excavated from the ruins of Pompeii (destroyed by an eruption of Vesuvius in A.D. 79), showing that this type of instrument persisted for a long time. Byzantium (Constantinople) was the first city to become an important center of organ building, and there the pneumatic organ, with the wind supplied by bellows, was first used. The first church organ is believed to have been installed during the time of Pope Vitalian I, in the seventh century.

Between the fourteenth and nineteenth centuries the Germans led the world in organ building, with the Dutch following, but the English came into front rank in the nineteenth century. The first American organ operated by electric power was used at the Centennial Exposition in 1876. There are now in North America a number of magnificent organs; some of the largest of these are in the Auditorium, Chicago; Convention Hall, Kansas City; the Roman Catholic Cathedral, Montreal; the Cathedral of the Holy Cross, Boston; the Mormon Tabernacle, Salt Lake City; and Music Hall, Cincinnati.

Structure of a Modern Organ. The sound is produced by the admittance of air into sets of pipes which rest upon wind chests. These wind boxes are supplied with compressed air by means of a number of bellows, operated in large instruments by steam or electricity. Hand power is sometimes used for small organs. To the upper part of each wind chest is attached a sound board, which is divided into as many grooves as the instrument has keys. By manipulation of the keys, valves at the lower ends of the pipes are opened and air is admitted into them. There are keyboards both for the hands and the feet, known respectively as *manuals* and *pedals.* The sound is controlled not only by the action of the keyboards, but by the manipulation of stop knobs, or slides. The pipes are arranged on the wind chests in ranks, or rows, each rank containing pipes having the same quality of tone, and those of each

rank are controlled by a single stop knob; for this reason the name *stop,* or *register,* is applied to any group of such pipes. The principal organ stops are the *open, stopped* and *double diapasons;* the *principal, dulciana, melodia, salicional, flute, trumpet, clarion, bassoon, oboe* and *vox humana.* The familiar parlor organ,



ORGAN PIPES
Explanation of letters appears in the text.

still popular in rural districts and in Sunday schools, is an instrument whose pipes are all reeds and the bellows of which are operated by the feet of the player. This organ has only a manual keyboard.

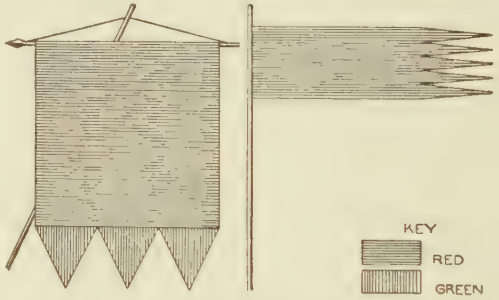
Sound pipes are classified as reed and flue pipes, the distinction consisting in the method of producing the tone. In the former the air sets a tongue into motion and causes it to strike against a reed. The flue pipe is shown in the accompanying illustration.

The first lettered diagram represents a pipe being sounded by a gentle blowing. Air enters through the little hole at the point and is deflected to pass out through the side opening. When it hits the sharp tongue it starts vibrations in the air column of the pipe. As the top and bottom of the column are in contact with the outer air the pressure at the points *L,* called *loops,* is always the same, and the air particles surge back and forth toward the middle point *N,* called a *node,* where there is constant change of pressure but no motion. From one loop to another is always half a wave length, so if the pipe is meant to sound middle *C* it must be about two feet two inches long (see SOUND). The second diagram shows what happens if the pipe is blown with greater force. The ends must still be loops, but a new loop and node form, and a whole wave length is now included in the pipe. Therefore the note is an octave higher than before. Another addition of force would produce one and one-half wave lengths, still another would give two. If the fundamental note were middle *C,* the first overtone would be the *C* above, the second *G* and the third the *C* next higher.

The third and fourth diagrams represent a pipe closed at the upper end. As motion is stopped at the closed end a node forms there. Thus with a gentle blow only a quarter of a wave length is included, and the fundamental note is an octave below middle *C.* More energy produces three-quarters of a length; still more, one and a quarter; more yet, one and three-quarters. The overtones are therefore the *G* above middle *C,* the *E* next higher, and so on. R.D.M.

Consult Broadhouse's *The Organ Viewed from Within;* Clarke's *Standard Organ Building.*

ORIFLAMME, *or'i flam,* a streamer of red silk, cut into three points, tipped with green tassels and suspended from a golden lance. It was the banner of Denis, patron saint of France. In early French history it was received by the kings from the abbot of Saint Denis, to be



THE ORIFLAMME
Its two common forms.

carried before them as they set out for battle. An ensign designed from this ancient relic remained the royal standard of France till the time of Charles VII.

OR'IGEN, surnamed ADAMANTIUS (about 185-about 254), one of the early Church fathers. He was born at Alexandria, Egypt, and was inducted into the Christian religion by his father, who suffered martyrdom for his faith when Origen was about seventeen years of age. Shortly afterward the young man became a

teacher in a school in Alexandria, and his reputation spread through all the Christian world. With intervals of travel, he remained in Alexandria until about 231, when during a visit to Palestine he was ordained a presbyter. Demetrius, bishop of Alexandria, declaring that he alone had the right to ordain Origen, had him deposed from the priesthood and ordered never to return to his native city, but the churches of Palestine and Asia Minor defended him, and he accordingly lived in Caesarea for the rest of his life. He escaped persecution during the reign of Maximinus, but under Decius was thrown into prison and tortured so severely that he died as a result of his injuries.

ORILLIA, *o ril' i a,* a town in Simcoe County, Ontario. It is prettily situated at the head of Lake Couchiching, and is noted for the scenic beauty of the neighboring section. It is a popular summer resort, but is also an important industrial center and railway junction point. Three railways, the Canadian Pacific, Canadian Northern and Grand Trunk, serve the town, which is eighty-six miles north of Toronto by rail and about eighteen miles directly north of Barrie. Orillia lies about midway between Georgian Bay and Lake Simcoe. Population in 1911, 6,828; 1921, 8,774.

Although Orillia was originally known merely as a resort, it is now of considerable importance industrially. Among its manufacturing establishments are clothing factories; saw and planing mills; furniture, carriage, automobile and boat factories; smelting and refining works; and various other industrial plants. Orillia owns and operates its waterworks and electric lighting system. Noteworthy public buildings are the Carnegie Library, the Collegiate Institute and the provincial asylum for the insane.

ORINOCO, *o ri no' ko,* a great river of South America, ranking next to the Amazon and the Parana in volume. Rising in the Parima highlands in Venezuela, near the boundary between that country and Brazil, it flows in a northwesterly direction until it reaches the Colombia boundary, then turns northward, forming the line between Venezuela and Colombia, and finally swings to the east, making its way to the Atlantic Ocean through a great delta 7,000 square miles in area. Its length is about 1,500 miles, and at flood season, in the spring, it sometimes spreads out to a width of 100 miles, while its delta has the appearance of a broad sea.

The Orinoco enters the ocean through about fifty channels. Though this mighty stream is navigable for large steamers to a point 700 miles from its mouth, and has another navigable reach of about 500 miles above the magnificent Maipures and Altures rapids, it is not an important commercial highway because much of its course lies in a densely forested region that is but sparsely inhabited. Ciudad Bolivar, 260 miles from the Atlantic, is the center of the river trade, and there is weekly steamship service between this town and Trinidad during a part of the year. Including the river's tributaries, most important of which are the Guaviare, the Meta and the Apure, the Orinoco system has a navigable length of 4,300 miles.

ORIOLE, *o' ri ohl,* a bright-colored bird of the family of the same name, the most familiar species of which is the *golden oriole.* This bird is a vivid yellow, with black on the wings and tail. It is resident throughout the continent of Europe and is known as a springtime visitor in the British Isles. It weaves a fabric-like nest and suspends it from the forked bough of a tree. The eggs are usually a glistening white, but with sometimes a pink tinge and a few spots of deep purple. A similar oriole is found in India, and other species are common in Southern Asia and Africa.

American orioles are not closely related to the Old World varieties. The Baltimore and orchard orioles are found in the Eastern states and the Bullock's and hooded orioles west of the Rocky Mountains and in Mexico. See Baltimore Oriole, for picture of nest, page 565.

ORION, *o ri' on,* a hunter who, in Greek mythology, saw and pursued the Pleiades, only to lose them. Later he sought to abduct the wife of Oenopion, who detected the scheme, frustrated it, and put out the eyes of Orion. In this pitiful condition, aged and alone, he wandered to the cave of the Cyclopes, who led him to the sun, from whom he borrowed light and youth again. Then Diana saw him and loved him, and Apollo, angered at what he considered her misplaced affection, challenged his sister to shoot at a black speck far out at sea. She succeeded at the first attempt, and was heartbroken when she learned that the speck was the head of Orion, who had been swimming in the ocean. To assuage her grief, she placed Orion, with his faithful dog Sirius, in the skies as the most beautiful constellation of its part of the heavens (see map, page 445).

ORKNEY, *awrk' ni,* **ISLANDS,** a group of islands separated from the north of Scotland by the Pentland Firth, which is six and one-fourth miles wide. Thirty of the islands are

inhabited, the total number of the group being sixty-seven, exclusive of a number of rocky islets. The principal islands are Pomona, or Mainland, Hoy, North and South Ronaldsay, Flotay, Burray, Ronsay, Shapinsay, Stronsay, Edray, Westray and Sanday. The total area is 375 square miles. Pomona and Hoy are hilly; the remainder of the islands lie somewhat low, with a bleak aspect on account of the lack of trees. The islands are in constant communication by steamer with the mainland.

The climate is mild, owing to warm ocean currents, the soil fertile, producing barley, oats, turnips and potatoes. Live stock, sea food, poultry and eggs are exported. The only important towns on the islands are Kirkwall, the capital, and Stromness, on the island of Pomona. The islands are visited by thousands of tourists, the nightless summer being one of the chief attractions. During the long days of summer the sun rises so early and sets so late that darkness is unknown. The winter days, however, are correspondingly short and dark.

The Orkney Islands were finally acquired by Scotland in 1590. They were previously held as security for the dowry of Margaret, daughter of the King of Denmark, when she married King James III of Scotland. The dowry was not paid, so the islands were released instead. The inhabitants are chiefly of Scandinavian and Scotch descent, and the total population numbers 24,100. Gaelic is spoken, but all the islanders understand and speak English (see GAEL).

ORLEANS, *ohr la ahN',* the name of two branches of a royal French family. These branches were known as the House of Valois-Orleans and the House of Bourbon-Orleans (see BOURBON). The first member of the Valois-Orleans branch to ascend the throne was Louis XII, grandson of the first Duke of Orleans. This branch of the family occupied the throne until the death of Henry III, in 1589. In that year the Bourbon line became the ruling house. Besides those members of the family who became kings, there were several dukes of Orleans who were prominent in the history of France.

Philippe (1640-1701), founder of the Orleans-Bourbon branch of the family, was the only brother of the "Grand Monarch," Louis XIV. He was created Duke of Orleans in 1661, the same year in which he was married to Henrietta Anna of England, a sister of Charles II. After her death he married Elizabeth of the Palatinate.

Philippe (1674-1723), Duke of Orleans, was the son of the foregoing. Before Louis XV reached his majority the duke acted as regent of France. In this capacity he permitted his extravagant and dissolute habits to overshadow his really brilliant talent for statecraft, and by recklessly introducing a large amount of paper currency nearly brought the country to a condition of bankruptcy (see LAW, JOHN). During his regency the affairs of state were largely in the hands of the Prime Minister, Dubois.

Louis Philippe Joseph (1747-1793), the fifth Duke of Orleans, is known usually as Philippe Egalité ("Philip Equality"). This name he assumed in 1792, during the French Revolution, to signify that he was on the side of the people and opposed to the court party. Though he voted for the death of Louis XVI, he was not trusted by the Revolutionary party, and in 1793 was arrested with the other members of the Bourbon family, and beheaded. The Louis Philippe (which see) who became king of France in 1830 was his son.

LOUIS PHILIPPE

ORLEANS, a city of France whose name at once recalls memories of Joan of Arc, the "Maid of Orleans," the young peasant girl who in 1429 led the French against the English and compelled them to raise the siege of this city (see JOAN OF ARC). In the middle of the leading square stands an equestrian statue, erected in her honor. It is thirty feet high and rests on a pedestal surrounded by bas-reliefs representing the leading episodes in the life of the famous maid. Her house has been turned into a museum for relics of her period. Among the other features of interest in the city is the Cathedral of Sainte Croix, which was destroyed by the Huguenots in 1567 and rebuilt by Henry IV and his three successors.

The city is the capital of the Department of Loiret, situated on the right bank of the Loire, seventy-five miles southwest of Paris. Manufactures and trade have declined greatly, although confectionery, pottery and woolen goods are still made. The city's chief interests now lie in its historical associations. Orleans was built on the site of an ancient Gallic town

which was destroyed by Caesar. Under the Merovingian kings and in the early history of France it was a place of importance. It suffered much in the wars of the Huguenots, and several battles of the Franco-German War of 1870 were fought in the vicinity of Orleans. Population, 1911, 72,000.

ORNITHOLOGY, *awr ni thol' o ji,* the branch of zoölogy that relates to the scientific study of birds, their habits, description and relation to man. The study of ornithology is commonly said to date from the time of Aristotle, but the foundations of the modern scientific development of the subject began near the end of the seventeenth century. Audubon greatly aided in this science by his standard work on *Birds of America.* Of recent years photography has been so perfected that it is possible to photograph birds in all their life functions, which has aided greatly in reaching a better understanding of our feathered friends. An Ornithologists' Union was organized in 1883, which has for its object the advancement of its members in ornithological science. See BIRD; AUDUBON SOCIETY, subhead *John James Audubon.*

ORONHYATEKHA, *o ron hy a te' kah* (1841-1907), a full-blooded Indian who became one of Canada's best-known physicians. Oronhyatekha is perhaps even more famous as an organizer and advocate of fraternal orders, and was for many years Chief Ranger of the Independent Order of Foresters. He was born near Brantford, Ont., and after some study in industrial schools attended Kenyon College (at Gambier, Ohio) and the University of Toronto. As a student Oronhyatekha won such standing that he was selected by the chiefs of the Six Nations, of which he was a member, to deliver an address to the Prince of Wales (later King Edward VII), on the occasion of the latter's visit to Canada in 1860. Although only a boy of nineteen, he made so strong an impression on the prince that he was invited to continue his studies at Oxford University. This he did, studying medicine under the direction of Sir Hy Acland, the prince's physician.

On completing his studies Oronhyatekha returned to Canada, and began to practice medicine at Frankford, Ont. Later he removed to London, Ont., and after 1889 made his home in Toronto, where he practiced with conspicuous success. In 1863 he married Miss Ellen Hill, a great-granddaughter of Joseph Brant (which see), the great chieftain of the Mohawks.

ORPHEUS, *awr' fuse,* a famous musician and poet mentioned often in Greek myths, and supposed to be the son of Apollo and Calliope. His musical powers were marvelous, and anyone who had a heavy task to perform was fortunate in securing the aid of Orpheus, for all things, even inanimate objects, were influenced by his playing. On the voyage of the Argonauts the music of his lyre made the good ship glide smoothly through the water and was of great service in securing the Golden Fleece.

ORPHEUS AND EURYDICE
From a painting by Leighton.

When he descended into Hades in search of his wife Eurydice, Cerberus forgot to growl, the wheel of Ixion stopped, Tantalus ceased trying to slake his burning thirst, Sisyphus rested on his rock, and Pluto and Proserpina were charmed into letting Eurydice go. By looking back when he had been warned not to do so he lost his wife a second time, and then in despair he cast away his lyre and vowed never to look at women again. One day, as he wandered disconsolately in the woods, he was met by a group of Bacchantes, who demanded that he should play for them to dance, and when he refused they killed him and threw him into the river Hebrus. His soul joined that of Eurydice in Hades.

ORRIS, *ahr' is,* ROOT, a corruption of *iris root,* the name of the underground stems of the European iris. The plant is cultivated for commercial purposes chiefly in Florence, Italy. In August the underground stems are dug, scraped, freed of small rootlets, dried and packed. On the market orris root appears in irregular, knobby sticks four inches or less in length. It has a faint odor like that of violets and is used in the manufacture of sachets and tooth powders.

ORSINI, *ohr se' ne,* the name of a wealthy and influential family of Rome, several members of which occupied the Papal chair. Among the most notable of these was Giovanni Gaetano Orsini, who became Pope in 1277 under the name Nicholas III. Others attained distinction as statesmen and generals. The Orsini rose to prominence in the twelfth century, and were the hereditary enemies of the Colonna family, whose members were allied with the Ghibelline party in the political struggles of the thirteenth and fourteenth centuries (see GUELPHS AND GHIBELLINES). The struggle between these two powerful families, characterized as it was by extreme bitterness and violence, often made the city a place of turmoil, and assassinations were not infrequent. The Orsini divided into seven branches, the only one surviving being that established in Naples by Francesco, Duke of Gravina.

ORTHOCERAS, *ahr thahs' er as.* Among the groups of shelled animals that inhabited the seas in past geological ages was an important genus known as the *orthoceras.* The animals of this group had a shell somewhat like that of the nautilus, but straight instead of curved. A series of chambers, separated from one another by cross partitions, occupied the interior, and each dividing wall had a small opening in the center. Fossils of about 200 species have been found, varying greatly in size. Shells have been discovered in the Trenton limestone of a size indicating the existence of an animal from twelve to fifteen feet long. See FOSSIL; GEOLOGY.

ORTHOCLASE, *awr' tho klase.* See FELDSPAR.

ORTHOPEDICS, *awr tho pe' diks,* from two Greek words, *orthos,* meaning *straight,* and *pais,* meaning *child,* is the branch of medicine, recently developed, which deals with the prevention and cure of natural deformities. In spite of its name, orthopedics is not limited to children, although they are much more successfully treated than adults. Preventive treatment is applied to delicate children who might, if neglected, become deformed. Curative treatment is given by means of special mechanical apparatus, methodical muscular exercise, correct clothing, fresh air and good food. Surgery is resorted to only in cases which demand it. Since the close of the nineteenth century a number of institutions have been founded in the world's larger cities for the practice of orthopedics, some of which are free sanitariums for children of the poor.

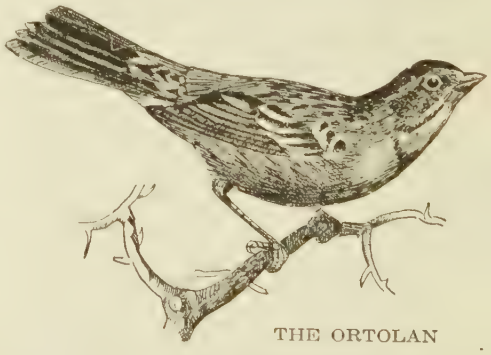
ORTHOPTERA, *ahr thop' ter a,* a large and important order of insects, including the crickets, locusts, green grasshoppers, katydids, cockroaches, mantis, walking sticks and leaf insects. The name of the order is derived from a Greek word meaning *having straight wings,* though this description does not apply strictly to all of the species. All members of the group have biting mouth parts, with which they bite off and chew their food. Most of them feed on live vegetable matter, but a few devour other insects. The locusts, in particular, are very destructive to crops. The life development of the Orthoptera is incomplete, as the newly-hatched young are much like the adult insects except that they are smaller and lack wings. They do not, like the butterflies, have caterpillar and cocoon stages of growth. Several families of the order (locusts, grasshoppers, crickets and katydids) consist of leaping and singing insects. Their "song," however, is not produced by vocal organs, but by the legs and wings.

Consult Howard's *Insect Book;* Comstock's *Manual for the Study of Insects.*

Related Subjects. The reader is referred to the following articles in these volumes:

Cockroach	Leaf Insect
Cricket	Locust
Grasshopper	Mantis
Insect	Metamorphosis
Katydid	Walking Stick

ORTOLAN, *awr' toh lan,* a garden bunting of Europe, where, particularly in the Southern countries, it is considered a great table delicacy. In the spring it wings its way as far north as Lapland, but when autumn nears it flies south-



THE ORTOLAN

ward to the Mediterranean countries. There great numbers are caught, usually in nets, and when they have been fed and fattened sufficiently, they are killed and prepared for table use. The ortolan belongs to the finch family, and is about the size of an English sparrow. Its plumage is a mixture of black, white and

brown. The well-known *bobolink* (which see) is sometimes called the *American ortolan.*

O'SAGE, an Indian tribe of Siouan stock, now living on a reservation in Northeastern Oklahoma. These Indians have the distinction of being the richest tribe, per capita, of any in the United States, for they secured good terms in selling to the government their former holdings between the Missouri and the Arkansas rivers, and have materially added to their wealth through the collection of royalties on oil wells now being operated on their reservation. It is said that their prosperity has tended to weaken them morally. The Osage Indians were generally friendly to the French throughout the colonial period, and were frequently at

OSAGE INDIAN FAMILY
From a photograph in 1917.

war with the neighboring Cherokee, Chickasaw, Creek, Choctaw and other tribes They are fast diminishing in number, only about 1,300 surviving, as contrasted with the 6,000 living in the early part of the nineteenth century. See INDIANS, AMERICAN.

OSAGE ORANGE, one of the most valuable of native North American trees. It was first found in Arkansas and surrounding territory, the country of the Osage Indians, and it bears an inedible fruit which resembles an orange; hence the name. Growing to a height of from thirty to sixty feet, and bearing long, tapering leaves of shining dark green, it is a desirable tree for ornament, shade and hedges. The tree also bears large thorns. It is remarkable for the milky, bitter sap which makes the foliage valuable food for silkworms, and for tannic acid from roots and bark. Its most valuable part,

OSAGE ORANGE
The tree, as seen in a hedge in winter; also leaves, flowers, twig and fruit.

the wood, is yellow, hard, elastic and satiny. Indians once made of it bows and clubs. It is used for wagon wheels, fence posts, telegraph poles, paving blocks, railroad ties and interior woodwork. Experiments by the United States government have shown that osage orange is valuable as a substitute for aniline dyes, being cheaper and about as efficient in producing browns, old-gold, chocolate, tans and olive shades, as fustic dyewood, which was heavily imported before the War of the Nations.

This tree is easily grown from root-cuttings, and although native to Southwestern states is widely cultivated as far north as New York. It is generally free from insect pests and plant diseases.

OSAKA, or **OZAKA,** *o za' kah,* an important manufacturing city and a commercial center for the internal trade of Japan, situated on the island of Hondo, on the Yedo River and on the shore of Osaka Bay. It is seven miles southwest of Kioto, and twenty miles southeast of Kobe, by rail. As its port does not admit of the entrance of large vessels, Osaka pours its millions of dollars worth of productions into the port of Kobe. Its enterprising business men have entered into business relations with leading American and European cities in the export of pearl buttons, hosiery, spun silk, raw silk, glassware and porcelain. Shipbuilding and the manufacture of iron and steel products are also carried on extensively. Osaka is intersected by canals and spanned by numerous wooden bridges, which have given it the name

of the *Venice of the East*. It possesses a famous castle, many temples and places of amusement and a fine government mint. There is a foreign settlement, occupied largely by missionaries. Population in 1919, 1,252,972.

OSCAR, *os'kahr,* the name of two kings who ruled Sweden from 1844 to 1907, excepting the years between 1859 and 1872, and who also ruled Norway until the separation of Norway and Sweden in 1905. During the interval above noted Charles XV, eldest son of Oscar I and brother of Oscar II, was king.

Oscar I (1799-1859) was the son of Charles XIV John, king of Sweden and Norway. He was born in Paris, but received part of his education in Sweden and identified himself with the aims and aspirations of his adopted country. In 1844 he came to the throne, and at once inaugurated a rule of peace and justice which was very popular with the masses of the people, though not always applauded by the upper classes. His especial desire was for parliamentary reform and he was successful in putting through several such measures despite the opposition of the nobles. His wife was Josephine Beauharnais, granddaughter of Napoleon's sorrowful empress, Josephine.

Oscar II (1829-1907), king of Norway from 1872 to 1905, and of Sweden from the first date until his death. He was the third son of Oscar I, and came to the throne on the death of his brother, Charles XV. From his accession he showed himself truly democratic and won not only the respect but the affectionate regard of his subjects. The two countries prospered under his sway, and he did his best to make of them one contented kingdom, but the desire of Norway for independence was so strong that in 1905 he was obliged to submit to the separation, and Norway became an independent power under Haakon VII. This was a great blow to King Oscar, and some authorities believe it was in part responsible for his death, but he refused to resort to arms to prevent the division.

OSCAR II

An enlightened ruler and a man of much culture as well as of commanding physical presence, Oscar stands out as a picturesque and noteworthy figure among the monarchs of nineteenth century Europe. He published a volume of lyric poems, translations of Herder's *Cid* and Goethe's *Torquato Tasso* and an excellent *Memoirs of Charles XII.* He was succeeded by Gustavus V, his son by Princess Sophia of Nassau, whom he had married in 1856.

For details of the separation of Sweden and Norway, which so grieved Oscar II, see SWEDEN, subtitle *History;* NORWAY, subtitle *History.*

OSCEOLA, *os e o'la* (about 1804-1838), an American Indian chief, born near the Chattahoochee River in Georgia. His father was an English trader named William Powell, and his mother was the daughter of a Creek chief. When he was four years old his mother went with him to the Seminole tribes in Florida and in early manhood he became their leader. In 1835, his wife, a half-breed daughter of a runaway negro slave, was taken into slavery by her mother's former owner, and Osceola became so wild with rage that he was kept in chains for six days by a government agent. A few weeks later he killed the agent, and this act began the second Seminole War. On the same day Osceola's men massacred 110 United States soldiers, and during the next two years terrorized all of Southern Florida by repeated onslaughts from the Everglades upon unprotected settlements.

On October 21, 1837, Osceola was induced, under a flag of truce, to have a conference with General Thomas Jesup, and was seized in the midst of the conversation. Imprisonment followed, first at Saint Augustine, Fla., and later at Fort Moultrie, S. C., where he died broken-hearted four months later. Historians generally agree that the early dealings with Osceola were anything but creditable to the whites. His Indian name was ASSEHEHOLAR.

OSH'AWA, a town in Ontario County, Ontario. It is situated on the northern shore of Lake Ontario, thirty-three miles northeast of Toronto. It is served by the Grand Trunk, Canadian Northern and Canadian Pacific railways, and by an electric railway which provides freight connection for all factories as well as good passenger service. Oshawa factories pay no direct switching charges, these being absorbed by the through rate. The town is almost exclusively a manufacturing community, its largest factories being devoted to the manufacture of automobiles. Other important products are war munitions, malleable iron, pianos, steam and gas fittings and various

other articles made of iron and steel. Oshawa is a customs port of entry. Alexandra Park, covering twenty-five acres, is a local feature, and also noteworthy are the Carnegie Library, the armory and the public hospital. Power for electric energy and lighting comes from the Trent River, which is a part of the Ontario hydroelectric system. The waterworks are owned by the town. Sugar beets of good quality are raised in the vicinity. Population in 1911, 7,435; in 1921, by the new Dominion census, 11,940. G.O.C.

OSH'KOSH, WIS., the commercial center for a large territory in the eastern part of the state. It is the county seat of Winnebago County, and is situated on the western shore of Lake Winnebago at the mouth of Fox River. Milwaukee is eighty-one miles southeast, and Madison, the state capital, is eighty-five miles southwest. The Chicago & North Western, the Chicago, Milwaukee & Saint Paul and the Minneapolis, Saint Paul & Sault Sainte Marie railways serve the city, and electric lines operate to other cities and towns in the Fox River valley. Steamboats ply north to Green Bay and south through the Fox and Wisconsin rivers to the Mississippi River. The place was settled in 1836 and was chartered as a city in 1853; it was named in honor of a Menominee Indian chief who was friendly to the early settlers. Oshkosh suffered heavy loss by fire in 1859, 1866, 1874 and 1875, but was each time rebuilt. Its government is administered on the commission plan. The population increased from 33,062 in 1910 to 33,162 in 1920, less than one per cent.

Oshkosh is located in a district that once yielded immense quantities of lumber, and although the forests in this locality are less dense than formerly, the lumber industry is still paramount in the city. There are large saw and planing mills and factories for making furniture, matches, building material, wagons and carriages; canneries, breweries and grass-twine factories are among the other industrial establishments. Noteworthy buildings are the government building, city hall, courthouse and Saint Mary's Hospital. Near by are the county hospital for the incurable insane, the county almshouse and the state Northern Hospital for the Insane. The city has in addition to its elementary and high schools a state normal school and a public library. Lake Winnebago provides yachting, fishing and boating in summer and ice boating and skating in winter. A state fish hatchery is located here.

OSIRIS, *o si'ris,* in Egyptian mythology, the husband of Isis and the father of Horus. He was the chief of the gods before the introduction of the worship of Ammon, and was recognized as the father of agriculture and of civilization. Set was the god of evil, the personification of all that was opposed to man, and Osiris, as the personification of good and of beneficence, fought with him, but was defeated and killed. Isis, however, found his mutilated body, and according to some accounts made from it Horus, who finally slew Set. Osiris lived always in the realms of the dead, and his soul inhabited the sacred bull, Apis, passing, when the bull died, to its successor. He is represented in Egyptian art in many forms—sometimes as a man with an elephant's trunk, sometimes as bearing the head of a goose or an ibis. Frequently the horns of a bull are shown on his head. Many temples were erected for his worship and the ruins of some of them still exist. His worship was introduced even into Rome, but the rites became so licentious that they were prohibited by law.

OSKALOO'SA, IOWA, the county seat of Mahaska County, is in the southeastern part of the state, sixty-five miles southeast of the state capital, Des Moines. It is on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific and the Minneapolis & Saint Louis railroads and has electric interurban service. The area is three and a half square miles. In 1910 the population was 9,466; it was 9,624 (Federal estimate) in 1916. The city contains Oskaloosa College (Christian), the National Holiness University and Penn College (Friends). The society of Friends in Iowa hold their annual meetings at Oskaloosa. The city has a Federal building, city hall, Carnegie Library and two hospitals, and in the City Park (one block) is a fine bronze statue of Chief Mahaska. A rich agricultural section surrounds the city. Industrial establishments include manufactories of silos, structural steel, fire hydrants, hot-air furnaces, brick, tile and building blocks. Oskaloosa was settled in 1843 and was incorporated in 1853. G.C.T.

OS'LER, the family name of two brothers who have achieved fame in two widely-varying lines of activity.

Sir William Osler (1849-1919), a Canadian physician and surgeon, long distinguished in his profession for the breadth of his medical knowledge no less than its depth, but in the mind of the general public unjustly known as the author of a misquoted statement that "a man should

be chloroformed at sixty." On leaving Johns Hopkins University in 1905, Osler delivered a farewell address, in the course of which he referred to the "comparative uselessness of men over forty years of age." "Take the sum of human achievement," he said, "in action, in science, in art, in literature, subtract the work of the men above forty, . . . we should practically be where we are to-day." To this he added:

> When a man nor wax nor honey can bring home, he should in the interests of an institution, be dissolved from the hive to give more laborers room.

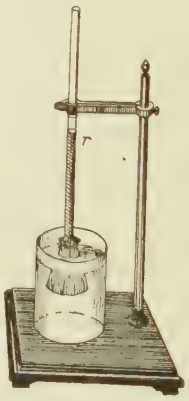
These remarks were freely misquoted, and gave the public a wrong idea of Osler's capacity and ability. His work has touched nearly every field of medicine. He has been a student and has made experiments, and has given his fellow-practitioners the benefit of his studies. Cerebral palsies, chorea, cancer of the stomach, diseases of the spleen and liver are a few of the subjects in which he is an authority. For many years he was a teacher, and he surrounded himself with students who formed a school of medicine which has left a permanent influence on that science. In addition to many medical books and monographs, Osler has written widely in the less technical fields of medical history, biography and essays. Among his books are *The Principles and Practice of Medicine; The Teacher and Student; Science and Immortality; A Way of Life; Counsels and Ideals;* and *Oliver Wendell Holmes, an Address.*

Sir William was born at Bondhead, Ont., studied at the Toronto School of Medicine and McGill University, and in London, Berlin and Vienna. From 1874, when he returned to America, he was professor of physiology and pathology at McGill University, until 1884, when he became clinical professor of medicine at the University of Pennsylvania. In 1888 he went, as professor of the principles and practice of medicine and chief physician of the hospital, to Johns Hopkins University, where he remained until his appointment, in 1905, as *regius* professor of medicine at Oxford, England.

Sir Edmund Boyd Osler (1845-), a Canadian financier and statesman, one of the leading bankers of the Dominion and since 1896 a prominent Conservative member of the House of Commons. Sir Edmund was born in Simcoe County, Ontario. His business career was begun in the employ of the Bank of Upper Canada, at Toronto. Later he organized the firm of Osler & Hammond, brokers and financiers, and became its president. He also took a leading part in railway development in Ontario, and became a director in the Canadian Pacific and several small railways. He is president of the Dominion Bank and an officer in many other banks and industrial corporations. He was an unsuccessful candidate for mayor of Toronto in 1892, but was elected to the House of Commons for West Toronto in 1896. In 1911 Sir Edmund was one of the most active and most prominent opponents of the reciprocity treaty with the United States. He was knighted in 1912. For many years he was a trustee of the University of Toronto; he resigned, however, in 1914, as a protest against the continued employment of Germans as members of the teaching staff.

OS'MIUM, from a Greek word meaning *odor,* occurs in platinum ores alloyed with the metal iridium, as *osmiridium.* Pure osmium, discovered in 1803, is in the form either of a fine black powder or of a hard, blue-gray mass. It is the heaviest substance known and the hardest to melt, because it turns to vapor before a very high temperature is reached. When heated above 200 degrees, a very irritating, suffocating vapor is given off, and this accounts for its name. The vapor may cause total or partial blindness, by spreading a film of metallic osmium over the eyeball. Compounds of osmium stain the skin black. The metal is used to tip gold pen-points. Four oxides are known, the peroxide or osmic acid being the most important.

OSMO'SIS, from a Greek word meaning *to push,* is the transfusion or mixture of two liquids separated by a membrane such as parchment or bladder skin. It may easily be demonstrated by tying a bit of parchment securely over one end of a glass tube containing a solution of sugar, and inverting the tube in a vessel of water, so the water and the sugar solution are at the same height. The water will pass through the membrane more rapidly than the sugar solution will pass out into the water, and this mixing will continue until there is



OSMOSIS

In the physical experiment illustrated above *r* represents the glass tube containing sugar in solution, referred to in the text. Osmotic pressure has raised the water in the tube half the distance to the top.

the same pressure within and without the tube. Sometimes, if the apparatus is large enough, so much water will push its way into the tube as to raise the level of the tube liquid twenty or thirty feet. This pressure of the water which is often many pounds to the square inch, is called *osmotic pressure*. It is governed by the same laws as those of gas pressure; that is, it depends on the concentration and temperature of the two solutions.

Food absorbed by the blood through the thin walls of the blood vessels and sap absorbed by the cells of plants are examples of the same phenomenon as the experiment with the sugar solution.

Consult Findlay's *Osmotic Pressure;* Morse's *Osmotic Pressure of Aqueous Solutions.*

OSNABRÜCK, *os nah brück',* sometimes called OSNABURG, the name given to the coarse linens manufactured in the place, is a town in Hanover, a province of Prussia. Osnabrück is the capital of the district of Osnabrück, and is situated in the fertile valley of the Hase, about seventy miles southwest of the city of Hanover. The town has important iron and steel works, and there are manufactures of railway equipment, agricultural machinery, paper, leather, chemicals and other commodities; it was formerly an important center for the manufacture of linen. Stone quarries and coal deposits are found in the vicinity. Among Osnabrück's interesting buildings are its great Roman Catholic cathedral, rich in relics, and its town hall, built in 1486, containing portraits of all the officials who signed here in 1648 the Peace of Westphalia, which closed the Thirty Years' War. The city, which dates from 772, was almost destroyed in the Thirty Years' War, but recovered its power again in the eighteenth century. Population, October, 1919, 85,017.

OSPREY, *os'pra.* See FISH HAWK.

OSSINING, *os'i ning,* N. Y., a village in Westchester County, thirty miles north of New York City, of which it is a residential suburb. It occupies an elevated site along Tappan Bay, on the east side of the Hudson River. Prominent features of the place are Sing Sing State Prison (one of the best known in the United States), south of the village, two military academies, a private school for girls, the Roman Catholic Foreign Missionary Seminary of America, the municipal building, a Carnegie Library and the Croton Aqueduct. There are manufactories of machinery, wire, pills, porous plasters and other products. Ossining was settled about 1700, and until 1901 was known by the name of its prison, Sing Sing, a name derived from that of the Sin Sincks Indians. The population in 1910 was 11,480; it was 10,739 (Federal census) in 1920. The name was changed on petition of the citizens, who preferred not to have their attractive village so closely identified with the notorious prison so close to their doors. H.A.C.

OSSOLI, *ohs'so le,* SARAH MARGARET FULLER, Marchioness (1810-1850), an American writer, born at Cambridgeport, Mass. Her father, ambitious for her, forced her education, and the strain injured her health, in spite of her unusual ability. She was early noted for brilliancy, eccentricity and violent passions. After her father's death she supported the family by teaching languages in Boston, part of the time in Bronson Alcott's private school, and by acting as principal of a private school at Providence, R. I. Her sparkling and learned conversation made her conspicuous among the Transcendentalists (see TRANSCENDENTALISM), and she became the editor of their paper, *The Dial.* She occasionally visited Brook Farm, but like Emerson realized that the experiment was sure to fail, and did not join it.

About 1840 she published some translations from the German, and soon after brought out her first original volume, *Summer on the Lakes,* describing a trip to Lake Superior. The most productive part of her literary life was in the years 1844-1846, during which she lived in New York and wrote brilliant essays on art and literature for the *Tribune.* She also wrote *Woman in the Nineteenth Century.* In 1846 she went to Europe, met many famous people, and married the Marquis d'Ossoli in Rome. During the Italian revolution of 1848 she served in the Roman hospitals, and when the city fell before the French she fled with her husband and infant son to the mountains, thence to Florence, and a little later sailed for America. On July 16, 1850, the entire family was drowned in a storm off Fire Island Beach, near New York, and with her was lost the manuscript of her history of the Italian revolution. The work she left does not fully explain the high position she held during her life, for much of this depended on her conversational powers, her learning and her magnetism when inspired by an audience. Emerson, Alcott and Hawthorne were among her noted friends.

Consult Goddard's *Studies in New England Transcendentalism;* Macphail's *Essays in Puritanism.*

OS'TEND, a fashionable watering-place in the Belgian province of West Flanders, situated on the North Sea seventy-seven miles northwest of Brussels. During the summer months in normal times from 16,000 to 20,000 visitors crowd its beautiful promenades along the sea walk, which is lined with wonderful shops, or enjoy the concerts in its magnificent Kursaal, the center of the social life during the season of gayety. But all are not on pleasure bent at Ostend, for it is an important fishing station, and cod and herring fishing as well as the cultivation of oysters constitute an industry of considerable importance. The city is also a port of first rank, a terminus of several branch railways which have connections with important systems on the Continent, and a station for steamers making daily trips between England and the mainland.

Ostend was established in the ninth century and is memorable for a protracted siege by the Spaniards, lasting from 1601 to 1604. In 1865 its fortifications were demolished. It, too, played a conspicuous part in the great War of the Nations (which see). After the seizure of Louvain, in 1914, the British marines landed at Ostend to check the German raiders, and during the first days during which Brussels was imperiled it was temporarily the seat of the Belgian government. It was seized, however, and partly destroyed by the German army, and later was repeatedly bombarded by the aeroplane fleet of the allies. Its normal permanent population is 43,000.

OSTEND MANIFES'TO, a dispatch signed at Ostend, Belgium, October 9, 1854, by James Buchanan, John Y. Mason and Pierre Soulé, at that time United States ministers to Great Britain, France and Spain, respectively. The Manifesto declared that if Spain would not sell Cuba, the United States would acquire it by force and prevent its being Africanized, like Hayti. These ministers met here at the suggestion of President Pierce. Nothing came of the Manifesto, as it was condemned by all political parties in the United States.

OSTEOPATHY, *os te op'a thi,* one of the most recent methods advanced for curing certain forms of disease without the use of drugs. The founder, Dr. Andrew Taylor Still, of Baldwin, Kan., believed that the body contains within itself the remedies for all disease, and that the bones could be "used as levers to relieve pressure on nerves, arteries and veins." Osteopathy teaches that the principal cause of disease is obstruction of the free circulation of the blood and lymph by bone displacement, and that by proper manipulation of the affected parts normal conditions may be restored. The operations are applied chiefly to the nerve centers, especially those along the spine, particular attention being given to the adjustment of bones and ligaments not in normal position.

Though many schools teach the principles of osteopathy, its efficacy in the cure of all kinds of disease has been contested by members of the medical profession. Since this system was formulated in 1875, it has been legalized in practice by twenty-three states and has over 7,000 practitioners in the United States and Canada. The first American college was opened at Kirksville, Mo., in 1892.

Consult Hulett's *Text-Book of the Principles of Osteopathy;* Still's *Osteopathy: Research and Practice;* Hazzard's *Practice of Osteopathy.*

OSTRACISM, *os'tra siz'm,* from the Greek word *ostrakon,* a *tablet of earthenware,* is the name handed down from the ancient Greek custom of casting votes by means of an earthenware tablet or a shell, the method by which Athenian citizens were banished for a political offense. It was not meant as a punishment, in every case, but sometimes was employed as a precaution taken to preserve peace. Banishment usually lasted about ten years, after which the citizen might return to his estate. Themistocles, Cimon and Aristides all suffered ostracism at some period (see the biographies of each of these Athenians in these volumes).

Aristides, called "the Just," a statesman and general, in 488 B. C. opposed Themistocles' naval policy, being ardently in favor of keeping Athens a land power. He was ostracised in 485 B. C., but returned from exile to aid Athens against the Persians. At the time of his banishment a man of the people came to him and asked for help in writing "Aristides" on his tablet. "Why," said Aristides, "has he ever wronged you?" "No," replied the man, "but I am tired of always hearing him called *the Just.*"

Ostracism is not practiced to-day, but *banishment* was resorted to in Russia prior to the revolution of 1917. In English-speaking nations one is *ostracized,* that is, given to understand that his social activities are unwelcome, if he has openly violated moral codes.

Consult Gilbert's *The Constitutional Antiquities of Athens and Sparta.*

OS'TRICH. The ostrich, largest of living birds, with its elevated back, padded toes, extremely small head and long neck, is such a

curious-looking member of the winged family that it is easy to understand why the ancients should have called it the *camel bird.* Not only is the camel suggested by its appearance and peculiar humping gait, but by its power of going for a long time without water—a faculty very necessary to its existence, in view of the fact that the persecutions of hunters have driven it for the most part to the dry plains and sandy deserts.

The ostrich is a native of Africa and Asia, and in former times great flocks grazed over both continents practically undisturbed, except when the Arabs chased them for sport or African natives stole the eggs for eating or killed

OSTRICHES, EGGS AND CHICK
The little ostrich is three days old and about ten inches tall.

a few birds for feathers with which to adorn their dusky bodies. They have never been killed for food, as the flesh is coarse and unsavory. Ever since the ostrich plume became a valuable article of commerce, however, the bird has been hunted with such persistence, and exported in such numbers to stock ostrich farms in other places, that it is now practically extinct in its native haunts save in the less accessible regions.

Physical Characteristics. A full-grown ostrich stands seven to eight feet high and weighs between 200 and 300 pounds. Unlike other birds, it has only two toes—the third and the fourth. The South American *rhea,* called the American ostrich, is distinguished from the true African variety by the possession of an additional toe. The eyes of the ostrich are very large and the neck about three feet in length, giving the bird a range of vision which enables it to detect danger at a distance of several miles. So powerful are its long, thick legs that the kick of an ostrich can disable and even kill horses as well as men. Both legs and thighs are perfectly bare of feathers, and the head and neck are covered only with a sparse growth of down; it is the body, with the beautiful fluffy plumage, that has been the source of the bird's commercial value. The female is modest in an unassuming dress of dull gray and white or brownish-gray feathers, but the male is a most handsome creature, with a glossy black body and wing and tail plumes pure white in color. His voice does not match his costume in beauty, however, for it is like a deep-toned roar, similar to that of a lion or ox, with a peculiar hissing quality; it adds greatly to the comfort of those near him that he is far from being a talkative bird.

Its Remarkable Swiftness. In his essay on Dryden, Macaulay wrote, "His imagination resembled the wings of an ostrich; it enabled him to run, though not to soar." The short wings of the ostrich, with their beautiful plumes, are quite useless for flight, but they help lift its weight from the ground; and the momentum thus gained combines with the running power of its sturdy legs to give it the amazing stride of twenty-five feet when in full flight. It can cover sixty miles an hour, outstripping the fleetest Arabian horse. On the ostrich farms of the Pacific coast races are frequently held between trained ostriches, and these are said to be far more exciting than horse races. Visitors are also entertained by the spectacle of some employee of the ranch riding "ostrich back" and being carried past as though on the wings of the wind.

The ostrich is unusually wary as well as speedy, but the weakness which makes it a victim of hunters is a lack of self-possession and good sense which causes it, when pursued, to run in a circle. Thus, while a single horseman cannot overtake it, a number are able, by surrounding and closing in upon their prey, to capture it with a lasso or kill it with spear, rifle or arrow. The old belief that an ostrich hides its head in the sand when threatened with danger is only a fable.

Its Family Life. The wild ostrich is a bigamist, with from two to seven hens, and he is also a sociable creature, traveling about the

country with other families in small groups or large flocks. Each female deposits about ten eggs in a circular hollow which the head of the family has scooped out of the ground with his toes. The eggs weigh about three pounds each —equivalent to two or three dozen of our breakfast eggs—and have shells so thick and strong that they serve the African natives as bowls and cups. Some of the eggs in the nest are intended as food for the young chicks, and many of the others are broken before the hatching; so that a brood is seldom larger than thirty chicks. Natives are very fond of eating ostrich eggs, but they are difficult to steal because the old birds are such vicious and powerful fighters.

The male assumes full responsibility for the hatching and safe-keeping of the eggs, sitting upon the nest at night with the hens grouped about him. In hot climates he covers it with sand in the daytime, depending upon the heat of the sun to keep it warm, but remaining close by to guard it. In this duty he is relieved from time to time by the hens. Lacking the hot sun and sand of African deserts, the domesticated birds brood upon the eggs all day as well as during the night. In from six to seven weeks the young ostriches emerge, already as large as one of our ordinary barnyard hens and with good appetites. If their hunger is abundantly satisfied, they mature so quickly that by the end of six months they have attained full growth. Wild ostriches subsist on grass, leaves, seeds and fruit, small birds and insects, with water whenever it can be procured, while those in captivity are fed mostly upon alfalfa and grain. The ostrich swallows any sort of hard, gritty material that comes in its path, such as stones, glass, bones and the like. These are used as other birds use gravel, to assist in the work of digestion.

Ostrich Farming. The ostrich has been reared in captivity for many years in Cape Colony, Algeria and Argentina, for a number of years in Arizona and Southern California, and more recently in Arkansas, Texas, Florida and Pennsylvania. Though the birds usually keep healthy and are rapid breeders, they are such voracious eaters that they prove an unprofitable investment when changes of fashion or interference with commerce (as during the War of the Nations) affects the market for plumes. Birds that originally were valued at $150 could be purchased for $5 after the outbreak of the great war. The plumes are taken from the bird about every seven months, but they are cut off, not pulled out, as many people suppose. The stumps of the severed feathers are taken out a few days later, that new ones may grow in their place. In normal years the value of the plumes obtained in one plucking varies from $20 to $50 for each bird. As the ostrich may live for eighty years, it will be seen that ostrich farming is a lucrative occupation when there is a demand for plumes. L.M.B.

Consult Martin's *Home Life on an Ostrich Farm;* Mosenthal and Harting's *Ostriches and Ostrich Farming.*

OS'TROGOTHS. See subhead, in article GOTHS.

OSWE'GO, N. Y., the most important port of entry on the southern shore of Lake Ontario, one of the largest shipping points on the Great Lakes for anthracite coal, and a terminus of the New York State Barge Canal (which see). It is the county seat of Oswego County and is situated at the mouth of the Oswego River. Syracuse is thirty-five miles southeast, by rail. The Delaware, Lackawanna & Western, the New York Central and the New York, Ontario & Western railways provide transportation, and steamers communicate with other lake and Saint Lawrence River ports. In 1910 the population was 23,368; by 1920 it had increased to 23,626 (only one per cent). The area of the city is about five square miles.

Oswego is beautifully located on ground slightly elevated above the lake, and is divided into two sections by the Oswego River. Handsome residences, beautiful parks, broad, regular streets and delightful drives, which extend along both banks of the river and continue on the shore of the lake, combine to make the city unusually attractive. The harbor is defended by Fort Ontario, and has an outer and an inner haven which will accommodate the largest vessels; immense trestles facilitate the handling of extensive shipments of coal, grain and lumber. When grain from the West was sent to Eastern mills to be converted into flour, Oswego was one of the chief manufacturing and shipping centers for this product. With the growth of the milling industry nearer the wheat fields, the making of flour declined in Oswego, and the excellent water power furnished by the thirty-five foot fall of the river and increased by the construction of five dams in the vicinity was used in manufacturing a great variety of commodities.

For many years the name of the town has been associated with starch; the city has one of the largest cornstarch factories in the world,

covering more than four acres. Knit goods, glucose, shades, matches, boxes and a variety of heavy and light foundry and machine-shop products are also made here. Interesting features are the state arsenal, the government building, city hall, courthouse, Fort Ontario and old Fort Oswego. The city has a state normal school and the Gerritt Smith Library.

In 1724 Oswego was an English military station and trading post, and it was conspicuous in King George's and the French and Indian Wars. Two forts were built here in 1755, but in the following year the place was taken by General Montcalm, who demolished the works. It was an important military center in 1759, and here Pontiac surrendered to the English in 1766. Oswego was incorporated as a village in 1828, and in 1848 it received a city charter.

OTHELLO, *o thel'o,* **THE MOOR OF VENICE,** a tragedy by Shakespeare, played in 1604 or 1605, but not printed until 1622. Shakespeare drew his plot from an Italian novel, and it is simpler than that of any of his other great tragedies. As a study in jealousy it has never been equaled, and the character of Othello gives wonderful opportunities to an actor capable of expressing the heights and depths of passion. Many of the greatest of English and American actors, among them Edmund Kean and Edwin Thomas Booth, have taken the rôle very successfully. Familiar quotations from the play include the following:

Green-eyed monster.

That men should put an enemy in their mouths to steal away their brains!

Who steals my purse steals trash; 'tis something, nothing:
'Twas mine, 'tis his, and has been slave to thousands;
But he that filches from me my good name
Robs me of that which not enriches him
And makes me poor indeed.

O'THO, the name of three successive rulers of the Holy Roman Empire, father, son and grandson. Their supremacy continued from A. D. 936 to 1002. Otho I, called also OTHO THE GREAT, founded the Holy Roman Empire.

Otho I, the Great (912-973), was the successor of his father, Henry I, as king of Germany, in 936. He was at once forced to resort to arms to defend his rights at home and abroad. The great nobles, putting forward Otho's brother Henry as their candidate for the crown, began a civil war, but before Otho could turn his attention to them he was forced to contend against the Slavs and Hungarians to the east and south, who were attempting to assert their independence. Successful in this, he defeated the turbulent vassals, taking from many of them their fiefs, which he bestowed upon friends and relatives whom he could depend upon to be faithful.

In 951 Otho was summoned into Italy by Adelaide, queen of Lombardy, who sought his aid against Berengar, a claimant to the throne and to her hand. By defeating Berengar and marrying Adelaide, he gained strong control in Northern Italy. On his return to Germany he had to meet an invasion of the Magyars, whom he decisively defeated in 955. Again, in 961, he went to Italy to settle disturbances caused by Berengar, and in the next year was crowned at Rome as Holy Roman Emperor.

The connection between Germany and Italy thus formed had a most unfortunate effect upon the history of the former nation in the centuries which followed. Later, Otho deposed the Pope who had crowned him (John XII), and had his candidate placed in the Papal chair as Leo VIII, thus asserting the superiority of the emperor over affairs of the Church. Otho ranks as one of the very strongest of early German rulers, but his more feeble successors were unable to maintain the empire which he had built up. Otho II, his son, succeeded to the throne.

Otho II (955-983), the second Holy Roman Emperor, was the son and successor of Otho I. He was crowned during his father's lifetime, and came to the imperial throne in 973 without resistance. Within a few years, however, the young emperor was called upon to meet several formidable enemies, and defeated successively Henry, Duke of Bavaria; the king of Bohemia; and Lothair, king of France, who had taken possession of Lorraine. Later, insurrections at Rome and at Milan led him to cross into Italy, and he was successful in establishing his power in Apulia and Calabria. The Greek emperor, however, summoned to his aid the Saracens, and at Cotrone, in 982, Otho was severely defeated. While he was making plans for a campaign against the Saracens he died at Rome, leaving the empire in a disturbed state at home and abroad. His successor was his son, Otho III.

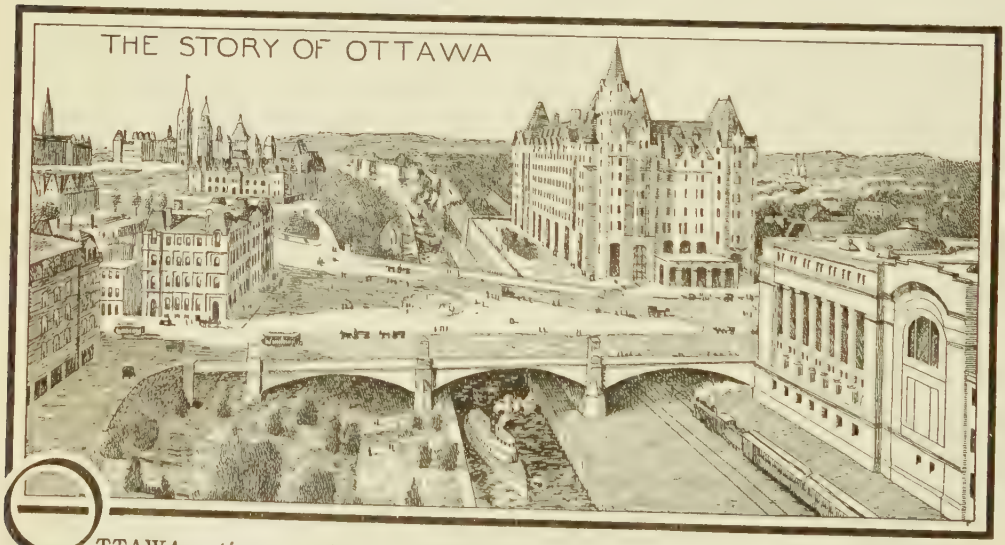
Otho III (980-1002), third Holy Roman Emperor, was the son of Otho II and grandson of Otho I. At the death of his father he was crowned king of the Germans, though but three years old at the time. His mother and grandmother acted as regents until 996, when Otho received the imperial crown and began to rule

in his own right. In 998 he was called to Italy to put down a disturbance caused by Crescentius, a Roman noble, and was completely successful. He placed his tutor, Gerbert, in the Papal chair as Sylvester II, and began to form plans for reviving the glories of the Western Empire and making Rome again the great capital which it had once been. The Romans, however, rose against him and he was forced to flee to Ravenna, where he died. Otho showed great promise, both as a soldier and as administrator, and had he lived might have proved one of the worthiest representatives of his line. A.MC C.

OTHO, MARCUS SALVIUS (32-69), one of three Roman emperors, whose short reigns succeeded that of Nero, and who were raised to power by the soldiers. Otho had been a favorite at Nero's court. He secured the throne for himself by murdering his predecessor, Galba, an old man of seventy-three years. His accession was not recognized by the German armies, who proclaimed their general, Vitellius, emperor. Vitellius led an army to Italy and defeated the Roman forces, whereupon Otho stabbed himself.

O'TIS, JAMES (1725-1783), a patriotic leader in the American Revolution, whose eloquent speech against the issuance of Writs of Assistance, delivered in 1761, won him lasting fame. Of this speech John Adams said, "American independence was then and there born." Otis was born at West Barnstable, Mass. He was graduated at Harvard College in 1743, studied law, was admitted to the bar in 1748, and became advocate-general of Massachusetts. His high character and ability were fully disclosed when the attempts of the colonists to evade the navigation laws caused the surveyor-general to apply to the superior courts for writs of assistance, used in searching for smuggled goods. Otis resigned his office rather than defend the application, and he became counsel for the opposition. Though the writs were not declared illegal, no more were enforced (see WRIT OF ASSISTANCE).

From that time on Otis was increasingly active in the Revolutionary agitation, and in 1765 he was on the Massachusetts committee which recommended the Stamp Act Congress. As a delegate to the Congress, he assisted in preparing the address to the British House of Commons. In 1769 he published a violent attack on the commissioners of customs; as a result of this he became involved in a quarrel with one of the commissioners, in the course of which he received a wound in the head. Much of his later life was spent in retirement, as his mind became unbalanced, probably as the result of the wound. He was killed by lightning at Andover, in 1783.



OTTAWA, *ot'a wa,* a city in Ontario, the capital of the Dominion of Canada. As befits the capital of a great Dominion, Ottawa has a beautiful location; the scenery is scarcely surpassed elsewhere in Canada. The city is built on a number of hills, rising sixty to 155 feet above the south bank of the Ottawa River. Just above the town the Ottawa River rushes over a picturesque cataract known as Chaudière Falls. The Indian name for the falls was *Asti-*

cou, which means *boiler,* and *Chaudière* is the French equivalent for this word. Just below the city are the Rideau Falls, where the Rideau River, divided into two channels by Green Island, rushes into the Ottawa. Three centuries ago, Samuel Champlain, the first white man to see these falls, called them "marvelous," for the river, he said, "descends a height of twenty or twenty-five fathoms with such impetuosity that it makes an arch nearly 400 paces broad. The savages take pleasure in passing under it, not wetting themselves, except from the spray that is thrown off." After due allowance is made for the great explorer's fancy, it is still true that the falls are picturesque. Amid such lovely surroundings Ottawa has grown from a few huts to a city of nearly a hundred thousand people. Its natural loveliness has been preserved, while splendid parks, wide avenues and imposing buildings have been added. Ottawa is truly worthy the dignity of being the Dominion's capital city.

Ottawa's early growth was due to water traffic. The city grew up at the northern end of the Rideau Canal (which see), which connects the Ottawa River with Lake Ontario at Kingston. There is still considerable local traffic on the canal, and steamers ply on the river between Ottawa and Montreal. But the railways have taken much of the traffic which formerly went by water. Three great trunk lines—the Canadian Pacific, Canadian Northern and Grand Trunk—and one shorter line, the Ottawa & New York, serve the city. The Canadian Pacific has lines on both banks of the river to Montreal. By the shortest rail route Ottawa is 101 miles west of Montreal and 217 miles northeast of Toronto. Four bridges, including a railroad bridge, cross the river between Ottawa and Hull, which lies directly opposite, on the north bank.

The city is divided by the Rideau Canal into two parts; the Upper Town, or western part, is predominantly English, and the Lower Town, or eastern part, is almost entirely French. A notable exception to this division of nationalities is the Sandy Hill district, which is east of the canal but is one of the most fashionable English-speaking sections of the city. The Lower Town, though interesting to many English-speaking visitors, has little of the old-world charm which makes Quebec so fascinating to tourists. The Upper Town, on the contrary, is far from commonplace, and has most of the prominent public buildings and fine residence sections.

Features of the City. Without question the chief architectural feature of the city is the Parliament Buildings, which stand on the summit of the highest hill overlooking the river. The structures cover nearly four acres, and form three sides of a quadrangle. They are in a modified Italian Gothic style, and are built of native sandstone. The central building, containing the halls of Parliament, is 470 feet long, and the Victoria tower, which crowns the edifice, is 180 feet high. Adjoining the main building on the rear is the Parliamentary library, a beautiful, many-sided structure housing about 200,000 volumes. The corner stone of these great buildings was laid in 1860 by King Edward VII, then Prince of Wales. In February, 1915, fire seriously damaged the central building, and for a few hours threatened to destroy the entire group. It was finally brought under control, and the work of reconstruction began almost immediately. In rebuilding, another story was planned, the total cost to be about $5,000,000.

A short distance from the Parliament Buildings is the Château Laurier, a magnificent hotel in the style of a French château, owned by the Grand Trunk Railway. Seen from a distance, the Château Laurier looks almost like one of the group of buildings on Parliament Hill. Directly across the street from the hotel, on the east bank of the Rideau Canal, is the union railway station, completed in 1912. Among other noteworthy buildings are the Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, Langevin Block, occupied by the postoffice department, the Royal Mint, Dominion Archives building, Victoria Museum, National Art Gallery and Carnegie Library. Rideau Hall, the residence of the Governor-General, is just outside the city.

Ottawa has a number of attractive parks, which are connected by fine boulevards. Parliament Hill, on which the Parliament Buildings stand, is set aside as a park. In it are statues of Sir John A. Macdonald, Alexander Mackzenie, Sir Georges E. Cartier and others. Strathcona Park, on the Rideau Canal, is the newest of the city's pleasure grounds; it was formerly a useless bit of swamp land. Major's Hill Park, east of the canal, is perhaps the prettiest of the parks. The Dominion government's central experimental farm, covering 400 acres, is also an attractive spot.

Ottawa is the seat of an Anglican bishop and a Roman Catholic archbishop. It has excellent schools, a collegiate institute, a normal school,

Outline and Questions on Ottawa

I. Location and Size

(1) On Ottawa River
(2) Population
(3) Reasons for growth
  (a) Water traffic
  (b) Choice as capital

II. Description

(1) Picturesque situation
(2) Division into two parts
  (a) English-speaking
  (b) French-speaking
(3) Buildings
(4) Parks
(5) Experimental farm
(6) Educational institutions
(7) Social life

III. Industrial Life

(1) Water power
(2) Chief products

IV. History

(1) Early explorers
(2) Settlement
(3) Choice as capital
(4) Growth

Questions

Why was Montreal deprived of the honor of being the seat of Government?

Why was the selection of Ottawa as the capital a wise one?

What did the Indians call the Chaudière Falls? What did the name mean?

How could you tell, if you walked along the streets and listened to the conversation of the passers-by whether you were in the Upper Town or the Lower Town?

Describe the natural beauties of the site of Ottawa.

To what was the early growth of the city due? Why is this factor no longer of prime importance?

Of what architectural style are the Parliament Buildings typical?

Who was the first white man who visited this site? What impression did it make on him?

What was the first name of the town? Why was it given and when was it changed?

How many cities of the Dominion are larger than Ottawa?

What park is named for one of Canada's great statesmen? What statesmen are commemorated by statues in another park?

several private educational institutions, and th University of Ottawa. It is, too, a center o social life, to which people of wealth, cultur and talent flock. There are many attractiv resorts near by, both for summer and for winte visitors. In recent years Ottawa has begun t rival Montreal in all kinds of winter sports.

Industrial Activity. The many attractions o Ottawa do not overshadow the fact that it i one of the chief manufacturing cities of th Dominion. Its annual output is approximatel $30,000,000 worth of manufactured articles. To gether with Hull, this section comprises one o the largest lumbering centers in the Dominion the lumber being floated down the Ottawa and its tributaries. There is abundant water powe for all kinds of mills and factories. In addition to lumber, matches, paper and various othe wood products, the important manufactures are carbide, mica, clothing, marine gas buoys and steel and iron products. There are about 200 manufacturing establishments.

History. The site of Ottawa was first visited by white men in 1613, when Champlain's party ascended the river. Thereafter for two centuries the Chaudière Falls portage lay on the main route from the Saint Lawrence to the far country in the West. In 1800 one Philemon Wright, a native of Massachusetts, built a hut on the north bank of the Ottawa River, where Hull now stands, but it was not until 1827 that a settlement of any size was made on the south bank. It was named Bytown, in honor of Colonel John By (1781-1833), a British army officer who superintended the construction of the Rideau Canal. In 1854 Bytown was incorporated as a city, and its name changed to Ottawa. Four years later it was selected by Queen Victoria as the capital of Canada. Montreal had been the capital until 1849, but had then forfeited its right to be the seat of government by the riots following the passage of the Rebellion Losses Bill. The other rivals, Toronto, Kingston and Quebec, were near the border and exposed to possible attack. The first Parliament to meet in Ottawa sat in 1865, and thereafter the city's growth was rapid. Population in 1911, 87,062, making it fifth in size among Canadian cities; in 1921, 107,843; with suburbs, about 150,000. G.H.L.

OTTAWA, a North American tribe of Indians belonging to the Algonquian stock. From their homes along the Ottawa River, in Canada, they were driven out by the Iroquois in the middle of the seventeenth century, and were forced to settle on Manitoulin Island, in Lake

Huron. After 1660 they scattered over the region now comprising lower Michigan and neighboring sections of Ohio and Illinois. Pontiac (which see) was their most famous chief. In the colonial wars the Ottawas always fought with the French against the English, but they joined cause with the English against the Americans in the Revolution and in the War of 1812. At the present time the Ottawas who live in the United States are found in scattered settlements in lower Michigan; the Canadian contingent is within the province of Ontario. Although originally these Indians were cruel, they were quick to adopt the arts of peace and industry, and learned eventually how to build comfortable huts, to till the soil and to raise domestic animals. See INDIANS, AMERICAN.

OTTAWA, ILL., the county seat of La Salle County, in the north-central part of the state, eighty-four miles southwest of Chicago. It is on the Illinois River and the Illinois and Michigan Canal, and on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads. It is also on the electric interurban line from Chicago to Princeton. The area of the city is three and one-half square miles. Its population in 1920 was 10,816.

Ottawa has Pleasant View Lutheran College, Saint Francis Xavier Academy, a Federal building, public library, Ryburn Memorial Hospital, the Illinois Appellate Court and city parks. Convenient deposits of coal, clay and glass sand are used in manufacture. The industrial establishments include plate- and opalescent-glass works, silica works, a foundry, a poultry-supply company, a sash, door and blind factory, and manufactories of clay products, pianos, washing and scouring powder and farm implements. Ottawa was settled about 1831 and was incorporated as a town six years later. In 1913 the commission form of government was adopted.

OTTAWA, UNIVERSITY OF, a Roman Catholic institution for higher education, at Ottawa, Ont. The university offers courses in arts, law, philosophy and theology, and also has a commercial and a large preparatory department. Approximately one-half of its 700 students take some preparatory courses. The university was founded in 1849, by the Oblate Fathers of Mary Immaculate, under the name of the College of Bytown. Its present title was assumed in 1866, and in 1889 the Pope raised it to the rank of a Roman Catholic university. In recent years the university authorities have taken a conspicuous part in the bilingual and religious disputes in Ontario and Quebec. One result of this prominence has been a decline in the number of English-speaking students, who now number about one-sixth of the whole student body.

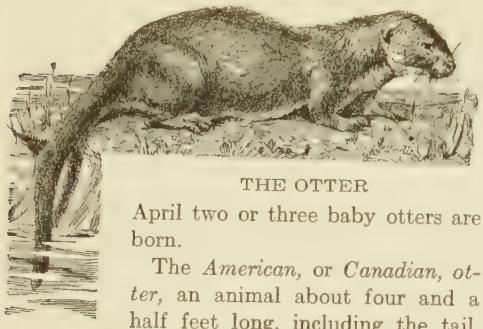
OTTAWA RIVER, the chief tributary of the Saint Lawrence River, and itself one of the most important rivers in Canada. The lumber trade on this stream and its numerous affluents is probably the largest in the world. This trade is the chief commercial interest of the various cities, of which Ottawa and Hull are the largest, on its banks. The gradual clearing of thousands of acres of timberlands has opened the land to settlement, and has made possible the extension of agricultural districts.

The Ottawa River rises on the eastern slope of the Laurentian Highlands, at a point about 160 miles north of Ottawa. After flowing westward for a few miles, it turns and pursues a general easterly course to the Saint Lawrence. It has two mouths, between which lies the island of Montreal, on which is the great city of the same name. For about one-half of its 685-mile course, the Ottawa forms the boundary between the provinces of Ontario and Quebec. The river is fed by many smaller streams, the chief of which are the Madawaska and Rideau on the south or right, and the Gatineau and Rivière du Lièvre on the left. All of these streams, but especially the Gatineau, carry immense quantities of lumber. The Gatineau flows almost due south from its source, which is about fifty miles north of Hull.

Navigation of the Ottawa River is impeded by occasional rapids and falls. The largest of these are the Rideau Falls, just above the city of Ottawa. Dams and slides facilitate the work of the lumbermen, but do not permit navigation by boats of large size. One of the Ottawa's tributaries, the Rideau, forms a part of the Rideau Canal system, which connects the Ottawa with Lake Ontario at Kingston. The Georgian Bay Ship Canal (see subhead under GEORGIAN BAY) will follow the course of the Ottawa from Mattawa to its eastern terminus at Montreal.

OTTER, *ot'er,* a valuable fur-bearing water animal, found in all parts of the world. The general characteristics are a long, thick body and long tail; large, flattish head; large nostrils, small ears and eyes; short, stout legs with webbed toes and sharp, curved claws. The fur, like the beaver's, is of two kinds. The underfur is short, soft and whitish-gray. Long, stiffer hairs of a rich brown color cover the undercoat. Otters are rapid swimmers and expert divers

after their principal food of fish. On land they delight in tobogganing down muddy slopes or icy hills. Common river otters make their homes in burrows in banks of streams or in caves above ground. Between February and



THE OTTER

April two or three baby otters are born.

The *American,* or *Canadian, otter,* an animal about four and a half feet long, including the tail, is especially plentiful in Canada. About 6,000 of them, valued at about $20 each, are killed in that country each year; during the last century 1,500,000 otter skins were sent to the London market from North America alone. The fur is used chiefly for coat linings, collars, cuffs and gloves. After the outer long hairs are removed the fur is often dyed a seal color and sold as a substitute for that fur. See FUR AND FUR TRADE.

Sea otters, found only on North Pacific coasts, are becoming rare. They very much resemble seals. Unlike river otters, they do not eat fish, but live on clams, crabs and mussels. Their tails are short, and their fur is soft and of a deep, lustrous black. It is one of the most valuable of furs, a perfect skin being known to sell for $2,000. People of Russia and China esteem it highly, and in the latter country it was used to trim the state robes of the mandarins in the days of the Empire.

Sea otters are very shy and cautious. They are captured by spearing, shooting, clubbing and netting. This species bears but one offspring at a time, and at any season of the year. Chinese fishermen have taught otters to help them in their task of fishing, just as they have the cormorant (which see). An Indian species is also trained to this work by natives of Bengal. M.S.

Consult Seton's *Life Histories of Northern Animals;* Stone and Cram's *American Animals.*

OTTER, SIR WILLIAM DILLON (1843-), a Canadian soldier, who rendered notable service in the Saskatchewan, or second Riel, Rebellion and in the South African War, and for half a century was active and prominent in Canadian military affairs. Otter was born near Clinton, Ont., and was educated at the Goderich grammar, school, the Toronto Model School and Upper Canada College. Joining the militia in 1861, when he was only eighteen years old, he took an active part in halting the Fenian raids in 1866. In 1869 he was promoted to the rank of major, and in 1874 became lieutenant-colonel. A year later he was conspicuous in suppressing the Pilgrimage riots at Toronto, and two years later served during the Grand Trunk riots at Belleville.

From 1883 to 1889 he was commandant of the Royal School of Infantry at Toronto. This service was interrupted by the Saskatchewan Rebellion of 1885. Colonel Otter commanded the center, or Battleford, column, and with his troops made a forced march of 190 miles in five and a half days. His command succeeded in preventing a junction of the forces of Riel and Big Bear, thus being one of the important factors in ending the uprising. During the South African War, General Otter again saw active service as commander of the first Canadian contingent. He was from 1886 to 1905 commander of the second military district of the Dominion, and was then until 1908 in command of the Western Ontario district. From 1908 to 1910 he was chief of the general staff, and from 1910 to 1912 inspector-general and chief military adviser to the Minister of Militia. In the latter year he retired from active service. King George V created him a knight in 1914.

OTTO I, *ot'o* (1815-1867), king of Greece, the second son of King Louis I of Bavaria. He was born at Salzburg and educated at the University of Munich. In 1832 the Conference of London suggested him for the throne of Greece, the National Assembly concurred in the choice, and the new king bade fair to be popular. For three years a regency governed, but in 1835 he took matters into his own hands, and it became apparent almost at once that his reign would not please the people. Taxes were heavy, the king's Bavarian counselors were hated, and the queen, Amalie of Oldenburg, was felt to have too large a share in the government.

In 1843 a revolutionary outbreak compelled Otto to grant a constitution and to appoint Greek ministers, but the difficulties increased rather than lessened, and the wavering policy of the government during the Crimean War incensed the people, who wished to interfere on the side of the Russians. In 1862 a military rising compelled him to flee the country. Otto

was a well-intentioned man, but too weak to rule in so troubled a time. See, also, GREECE, subtitle *History.*

OTTOMAN, *ot'o man,* **EMPIRE.** See TURKEY.

OTTUMWA, *o tum'wa,* IOWA, the county seat of Wapello County and an important manufacturing and distributing point in Southern Iowa. It is situated on the Des Moines River, ninety miles southeast of Des Moines, the state capital, seventy-five miles east and south of Burlington and seventy-five miles southeast of Keokuk, by rail. Ottumwa is the junction of the Chicago, Burlington & Quincy, the Chicago, Minneapolis & Saint Paul, the Chicago, Rock Island & Pacific and the Wabash railroads. The place was settled in 1849, was incorporated as a city in 1851, and since 1913 has been governed on the commission plan. Ottumwa is an Indian name and means *falling water.* The population was 22,012 in 1910; it was 23,003 in 1920 (4.5 per cent gain). Only five per cent of the inhabitants are of foreign birth. The area of the city is seven square miles.

Ottumwa is located in the heart of the bituminous coal fields of the state; more than half of all the coal produced in Iowa is mined within forty miles of the city. It is also surrounded by a fine agricultural and stock-raising district, producing in abundance, grain, fruit, garden truck, poultry and dairy supplies. Several thousand men are employed in the various manufacturing plants, engaged chiefly in making farm implements and all kinds of foundry, machine-shop and lumber products, the annual output being estimated at $21,000,000. The city has grain elevators and one of the largest independent meat-packing houses west of the Mississippi River. Noteworthy features are the $235,000 United States government building, a new $300,000 hotel, the courthouse, Y. M. C. A. and Y. W. C. A. buildings, the union station and the city hospital. Ottumwa has forty-two churches, Saint Joseph's Academy, a Carnegie Library with 32,000 volumes and two conservatories of music. J.N.W.

OUACHITA, *wash' i taw,* **RIVER.** See WASHITA RIVER.

OUIDA, *we'dah.* See RAMÉE, LOUISE DE LA.

OUNCE, *ouns,* a common unit employed in weighing, equal to one-twelfth of a pound, or 480 grains, Troy weight, and one-sixteenth of a pound, or 437½ grains, in avoirdupois weight. As grains in all weights are the same, they furnish the basis for computations involving different systems of weights. In the United States the apothecaries' ounce is the Troy ounce; in Great Britain, the avoirdupois. In the United States, the fluid ounce is one-twelfth of a wine pint and in Great Britain one-twelfth of an imperial pint. The name is derived from the Latin *uncia,* meaning *twelfth part of any magnitude.* See DENOMINATE NUMBERS; WEIGHTS AND MEASURES.

OUNCE, a name given to the beautiful *snow leopard,* whose home is far up in the cold mountain regions of Central Asia. Its rough, heavy hair is nearly white, with slightly marked, large spots; with this protective coloration it can steal unnoticed over the snow and suddenly seize its prey. In its native rocky home, the ounce feeds chiefly on goats, sheep or other animals, but seldom attacks man. Its tail is long and bushy, while the unusually warm coat of fur protects it from cold which others of the cat family could not endure. If the animal is taken away from the snowy regions into more temperate zones, the fur soon turns darker. See LEOPARD.

OUTCAULT, *out'kawlt,* RICHARD FELTON (1863-), a cartoonist, famous as the creator of the characters "Buster Brown" and the "Yellow Kid," so popular with little boys and girls. He was born at Lancaster, O., and received his education at Cincinnati. He started his career as a comic artist in 1895, and since then his *Buster Brown, The Busy Body, Buster Brown in Foreign Lands, Buster Brown and His Pets, Real Buster and the Only Mary Jane,* and his *Yellow Kid,* as well as *Pore Lil' Mose* and the *Hogan's Alley* series, have been a distinctive feature of Sunday supplements of leading newspapers. All his creations have been dramatized and published in book form.

OUTRAM, *oo'tram,* SIR JAMES (1803-1863), an English soldier and statesman, known by reason of the part which he played in the history of British India as the "Bayard of India." He was born in Derbyshire and went to India in 1819 in the service of the East India Company. In various conflicts with the natives and in the Afghan War of 1839 he did good service, and in 1857 joined the expedition against Persia.

It was during the Sepoy Rebellion in 1857, however, that he chiefly distinguished himself. Offered the command of the relief forces sent to Lucknow, he refused to take precedence of Havelock, whom he accompanied as chief commissioner of Oudh; and he had a large part in the victorious campaign against the insurgents.

In 1860 ill health forced him to return to England, where the rest of his life was spent.

OUTREMONT, *oo tr' mawN',* a city in Hochelaga County, Quebec, a residential suburb of Montreal, which it adjoins on the northwest. Its name, a compound of *outre* and *mont,* means *beyond the mountain,* and refers to the location of the city with respect to Mount Royal. The founders of Outremont, in the early years of the nineteenth century, were the Christian Brothers, better known as the Sulpician Fathers, who called the new settlement Côte Saint Catherine, the name by which it was known until 1875, when it was incorporated as the village of Outremont. It became a town in 1895 and a city in 1915. From the beginning of its municipal career Outremont has had the benefit of stringent building regulations and other ordinances which restricted or entirely eliminated undesirable features of city life. It has good stores, schools and churches, free skating rink in the park and abundant opportunity for winter and summer sports, but has never had a saloon. Outremont is served by three railway lines, the Canadian Pacific, Canadian Northern and Grand Trunk, and also by electric street railway to Montreal, whose center is about two and a half miles from Outremont. Population in 1911, 4,820; in 1921, 12,997.

OUZEL, *oo'z'l,* a sprightly little bird of the dipper family, whose home is in mountainous regions along the banks of dashing streams, where it appears as cheery in winter as in summer. Its flight is powerful, rapid and direct, and it descends with a suddenness which is startling. The water ouzel, found in both Northern Europe and Western America, is about the size of a robin, and has a delicate gray body with brownish-tinged head and wings. The birds stand on stones in streams, bobbing up and down and jerking their short tails, until suddenly they dive noiselessly down into the water in search of food, consisting largely of the eggs and young of water insects. They seem quite at home in the water, even swimming below the surface for a considerable distance. Their oven-shaped nests made of moss are always placed near running water. Three to five white eggs are laid.

THE WATER OUZEL

OVEN, *uv'en,* **BIRD,** a common American warbler, called also the *golden-crowned water thrush,* from its resemblance to a small thrush, has a brown back, dull-orange crown and white breast spotted with black. Its singing note resembles the word *teacher,* repeated several times and in an ascending key. The oven bird nests from Kansas to Virginia and northward to Manitoba and Labrador. It takes its name from its nest, which is built somewhat in the shape of a rude oven, made of grasses and clay.

THE OVEN BIRD

Sometimes several months are required to construct the nest. The eggs are four or five in number and are white, speckled or spotted with cinnamon color. These birds live wholly on insect food. A South American bird which builds a dome-shaped nest of mud is also called by this name.

OV'ID (Publius Ovidius Naso) (43 B.C.-A.D. 18), a celebrated Roman poet, was born at Sulmo. His father gave him an excellent education but insisted on his studying law, although his natural inclinations were toward a literary career. After studying for a time in Athens he took up his residence in Rome, but unfitted by reason of his natural indolence for a public career, he contented himself with one or two subordinate offices. Soon even these were given up, and he spent his time in writing and in the pursuit of pleasure. Ovid was twice married while very young, but each time divorced his wife shortly after marriage, and before he was thirty was married for the third time.

In the year A.D. 8 he was banished by an edict of Augustus from Rome to Tomi, a town on the shores of the Black Sea. The ostensible reason for this banishment was the publication of the *Ars Amatoria,* but the real reason it is impossible to discover. Ovid speaks of it but vaguely, and it is supposed to have been con-

nected with his knowledge of a love affair of the granddaughter of Augustus. Life in the rude and barbarous country to which he had been sent was a most unpleasant change from the luxurious life of a Roman man of letters, and Ovid himself and his many friends made repeated attempts to shorten the term of his banishment or at least to secure a change of place; but all such attempts were in vain, and Ovid died at Tomi.

Ovid's works include the *Ars Amatoria* (Art of Love); *Epistolae Heroidum* (letters from heroines to their lovers); *Amorum Libri* (Love Elegies); *Nux,* the lament of a nut tree over the treatment received from all passers-by; *Fastorum Libri,* a sort of poetical calendar; and the *Metamorphoses* (Transformations), his best-known work, which contains an account of all transformations described in legend down to the time of Julius Caesar, who was changed to a star. Ovid's ease of style and his musical verse have made him popular despite the fact that he is always rather superficial in thought and in feeling, and shows no reverence for even the deepest things of life. His moral tone is not of the highest.

OWEN, *o'en,* ROBERT (1771-1858), the founder of the coöperative movement in England, and the first factory owner to prove that an employer profits by helping his employees. He declared that "all poverty and crime are the effects of error in the various systems of training and government."

Owen was born in Wales, but while still a boy he became a cotton spinner in England. He showed such pronounced ability that when only nineteen he was made a mill manager. In 1799 he became part owner of mills at New Lanark, Scotland, and immediately began to apply his principles by establishing a paternal government among his factory people. He insisted upon cleanliness, temperance and religious toleration, employed no help under ten years of age and established free schools for children between the ages of five and ten. In 1824 he purchased the property of the community-village of New Harmony, Indiana (see COMMUNISM), but his experiment there failed, partly for lack of capital. Though the Lanark mills were profitable under his superintendence and he brought his people out of poverty, opposition on the part of the churches resulted in his retirement in 1828. He spent the rest of his life advocating community villages for the poor, coöperation and socialism, which were then new doctrines.

OWENSBORO, *o'enz bur o,* KY., an important tobacco market and manufacturing center and the county seat of Daviess County. The town is situated on the Ohio River, 114 miles southwest of Louisville and forty miles southeast of Evansville, Ind. It is served by the Illinois Central, the Louisville & Nashville and the Louisville, Henderson & Saint Louis railroads. Population in 1910, 16,011; in 1920, 17,424; added in 1920, 3,636, by annexation. Owensboro is in a rich agricultural and stock-raising section and has an important river commerce in coal, iron and grain. Oil, coal, clay, building stone, iron, zinc and lead ores are found in the vicinity. It is one of the largest leaf and strip tobacco markets in the United States, and in 1920 had 64 factories, employing $6,165,000 capital. Products that year were worth $8,635,000.

The city has Owensboro Woman's College (nonsectarian), Saint Francis Academy, a Federal building, completed in 1912 at a cost of $175,000, a Masonic Temple, Carnegie Library, city hospital, county courthouse and jail and Hickman Park. Owensboro was named in honor of Colonel Abraham Owen, who was killed in the Battle of Tippecanoe. It became a city in 1866. G.H.C.

OWEN SOUND, a town in Ontario, the county town of Grey County. It is situated at the southwest corner of Georgian Bay, on a small sound from which it takes its name. The town site slopes gradually to the sound, and has two rivers, the Sydenham and the Pottawatamie, flowing through it. The mouth of the Sydenham River forms the inner harbor, on which are located the terminal stations of the Canadian Pacific and Grand Trunk railways. By rail, Owen Sound is 122 miles northwest of Toronto and 140 miles northwest of Hamilton. The sound is twelve miles long, and is deep enough for the largest vessels. Steamship lines, both for passengers and for freight, run to all important ports on the Great Lakes and the Saint Lawrence River. Population in 1911, 12,612; in 1921, 12,190.

Owen Sound is an important manufacturing center. About 30,000,000 feet of lumber are cut each year in the local sawmills. The chief products are furniture and various articles made wholly or partly of wood, and iron and steel products. Among these are mill machinery, turbine water wheels, wire fences, wire nails, stoves, agricultural implements, malleable iron and boats. Other manufactures are Portland cement, lime, brick, linseed oil, vinegar

In the hollow tree, in the old gray tower,
The spectral Owl doth dwell;
Dull, hated, despised, in the sunshine hour,
But at dusk—he's abroad and well!
Not a bird of the forest e'er mates with him—
All mock him outright, by day:
But at night, when the woods grow still and dim,
The boldest will shrink away!
O, when the night falls, and roosts the fowl,
Then, then, is the reign of the Horned Owl!
BARRY CORNWALL: *The Owl.*

and pickles. Hydroelectric power is obtained from Eugenia Falls, thirty-six miles away. The town owns and operates all its public utilities. Owen Sound is also known as a summer resort, and its good hotels, fine wooded scenery, its boating and bathing draw many visitors. Queens Park, in the center of the town on the river bank, and Harrison Park, are attractive features. R.D.L.

OWL, a solemn-looking, solitary bird of prey belonging to a family which includes about 200 species. Some owls are so tiny that one can be worn on a woman's hat; others are as large as some of the eagles. Most owls are nocturnal in their habits, that is, they work and feed at night, and their eyes are especially fitted to see in the dark. In the daytime these birds sleep in some secluded spot. The eyes are set close together and cannot move in their sockets as do human eyes, so if owls wish to look in any direction other than straight ahead they must turn their heads. A ruff of feathers surrounds each eye, and the effect is an odd appearance of wisdom, but owls are not as wise as they look. As an emblem of wisdom the owl in the mythology of the old Greeks was sacred to Athene (the Roman Minerva), goddess of wisdom.

Some species have tufts of feathers which look like ears or horns. All are short, bulky birds. The bills are short, strong and hooked. The legs are short and powerful, usually feathered to the toe. The body plumage is soft and thick, and the wings are especially adapted for quick, noiseless flight, helpful when the owls are pursuing their living prey of mice, squirrels and other gnawing creatures, birds and insects. The prey is usually swallowed whole, if not too large, and the bones and hairs are later ejected through the mouth in pellets. Holes in trees, caves, old buildings and church belfries are the favorite homes of owls, and there they roost, sleeping or blinking blindly in the dazzling light of day. There, too, they lay their eggs, numbering from two to ten, which hatch into downy, odd-looking young.

The call of owls, usually heard at night, is mournful, and sometimes is a weird, startling hoot which has caused some people to regard the bird with superstition. Owls really do more good than harm, however, and should be regarded as the farmer's faithful night watchmen that destroy many insect and other animal pests. According to a report of the United States *Biological Survey*, only six of seventy-three species and subspecies of hawks and owls of the United States are injurious to crops or poultry.

Some Species. The little *screech owl*, eight inches in length, and in color gray or red, is one of the most common species in the United States and Southern Canada. It is especially valuable as a destroyer of mice, and should be encouraged to remain about barns and granaries. Gray *barn owls* are also numerous. The *great horned owl*, common throughout North and South America, is a large brown and white bird, often destructive to poultry and game birds. The *snowy owl* of the north is a large, handsome bird, which hunts by day and attacks ducks and other valuable waterfowl. *Long-eared owls* appear in the woods of both hemispheres. *Short-eared owls* are widely distributed over prairies and meadowlands. The *burrowing owl* of Western America lives in the homes of prairie dogs and other ground animals, and preys upon those little burrowing creatures. The sooty-brown, fierce *hawk owl* also hunts by day. There are many well-known species throughout Europe.

Consult Evans' *Birds;* Fisher's *Hawks and Owls;* De Kay's *Bird Gods.*

OWOSSO, *o wos'o,* MICH., a city in Shiawassee County, in the central part of the state, twenty-six miles northeast of Lansing and seventy-eight miles northwest of Detroit. It is situated on both sides of the Shiawassee River, in the midst of a fertile agricultural section. Transportation is provided by the Ann Arbor, Grand Trunk and Michigan Central railroads and the Michigan United Traction line. The population, which in 1910 was 9,639, was 12,575 in 1920, a gain of 30 per cent.

Prominent features of Owosso are a Federal building, Carnegie Library, convention hall and hospitals. There are important manufactures of caskets, screen doors and windows, iron, furniture, bats, etc. A sugar-beet factory and canning establishment are other large industrial plants. Owosso was settled about 1832, and became a city in 1859. The commission form of government was adopted in 1913. W.A.S.

OXALIC, *ok sal'ik,* **ACID,** one of a series of organic acids, of great importance commercially. It occurs in many plants, especially the wood sorrel, called by botanists *oxalis acetosella;* hence its name. It is very poisonous. Cases of its use by mistake for Epsom salts (which it resembles) are frequent, and are usually fatal unless milk of lime, chalk or milk is quickly administered. It is chiefly important as a bleach in all kinds of commercial enterprises, especially in leather and cotton-goods manufacture, and is also used to remove ink and iron stains. It is important, too, in the manufacture of certain chemicals, especially manganese dioxide.

Oxalic acid is prepared commercially by fusing sawdust (cellulose) with caustic potash or soda (potassium and sodium hydroxide) in iron pans. The sodium and potassium salts so formed are extracted with water and sulphuric acid. Oxidation of starch or sugar by nitric acid is another common method. With bases, it forms salts called *oxalates.* Of these the most important is lime oxalate, which has medicinal qualities. It is present in rhubarb and in certain lichens. Potassium oxalate is well known in commerce as *salts of sorrel.*

OX'FORD, the home of a world-famous university, is a Parliamentary borough of England and the county seat of Oxfordshire. It is situated at the junction of the Thames, there called the Isis, and the Cherwell rivers, fifty miles northwest of London. It is built on a low plain, surrounded by hills, and since 1830 has grown rapidly, extending its area into the beautiful suburban districts. The center of Oxford is at a place called "Carfax," from which four main streets run to the four points of the compass. High Street, which derives peculiar interest from its long connection with academic history, is one of the finest thoroughfares in all England. Oxford is also called the *Cathedral City,* because of its many notable churches; the most famous are Saint Mary's, Saint Michael's and Saint Peter's. The university buildings, however, are of greatest interest.

Oxford is first mentioned in history in the tenth century, although there are evidences that it existed before this time. During the Middle Ages it occupied a place of considerable importance. In 1258 the Provisions of Oxford were passed by a Parliament assembled here. During the struggle of Charles I with Parliament, Oxford was the center of the Royalist movement, and although besieged by the army of Parliament, the city was not bombarded; so,

fortunately for the world, its famous buildings remained intact. Population in 1921, 57,052. See Oxford University.

OXFORD MOVEMENT, a revival in the Church of England which began at Oxford in 1833. The immediate cause was the preaching by John Keble of a powerful sermon on national apostasy. A few men joined Keble in his attempt to reclaim the Church from the state of spiritual apathy into which it had fallen and to restore to public worship the symbolism that was possessed by the Roman Catholic Church in the Middle Ages. The originators of the movement began the publication of a series of tracts called *Tracts of the Times.* These tracts treated of the doctrine, polity and worship of the Church. Others joined the movement and for a time it grew rapidly. Its most eminent advocate was John Henry Newman, who later became a cardinal in the Roman Catholic Church (see Newman, John Henry). Because of the tracts the leaders of the movement were termed *Tractarians,* and their doctrine was known as *Tractarianism.* With the withdrawal of Newman in 1845 the original organization began to disintegrate, but the movement was broadened and exerted a considerable influence for a number of years. Its chief outcome was the establishing of the High Church branch of the Church of England. Other results were the quickening of the spiritual life of the Church and raising the standard of worship. See Church of England; Roman Catholic Church.

Consult Hall's *Short History of the Oxford Movement;* Gladstone's *Correspondence on Church and Religion.*

OXFORD UNIVERSITY, the oldest university of England. It is one in which Americans are especially interested because of the system of Rhodes Scholarships, by which a limited number of students from each English-speaking country in the world may gain admission to it and have their expenses paid at the rate of $1,500 a year for three years (see Rhodes Scholarships).

Oxford University is situated at Oxford, England, about fifty miles northwest of London. There are a number of traditions relating to the origin of the institution, but no authentic records of the existence of a school at this place previous to 1167 have been found. During this year foreign students were expelled from the University of Paris, and many who returned to England went to Oxford with their masters, and continued their studies.

This early school was a guild whose chief purpose was to control teaching by restricting the number who might engage in the world of instruction. There is no record of the plan of organization previous to 1214. It is probable that the masters elected one of their number as head officer and bestowed upon him the title of chancellor, a title which the head of the university still bears. The students organized themselves into groups, corresponding in some respects to modern college fraternities. These groups received licenses from the university and their members lived in homes or inns which were known as halls. Friction between the authorities of the town and the university led to frequent "town-and-gown" riots, and in 1209 a large number of students withdrew and went to Cambridge. Finally the university obtained a royal charter, freeing it from the control of the town authorities, and later it was given control over the town itself.

The colleges which now constitute the university appeared about 1250. At first they were simply endowed boarding houses for poor students. From this beginning they gradually developed into institutions for instruction. One college followed another, century after century, until in 1917 there were twenty-two in all (besides three private halls), combining to form one of the most distinguished institutions of higher education in the world. The head of a college is known as warden, provost, principal, president or master. Each college has its *fellows,* its own students elected to fellowships after graduation. They live at the college, sharing in its management, studying and teaching. There are also tutors, or teachers, in each college. Each student is under the direction of a tutor, but in personal matters rather than scholastic. The head of the school, the fellows, and the tutors are all known as dons. A few of the best-known colleges among the twenty-seven are University, Balliol, Exeter, Queen's, Magdalen, Corpus Christi, Christ Church and Trinity. Women have been permitted to attend lectures since 1884, but they receive no degrees.

At Oxford there are no recitations. During the morning the professors give lectures which the students attend. The afternoons are given to athletics, and every undergraduate student is expected to take part in the sports of cricket, football, rowing, etc. A part of the university course is "reading," which is done in the evenings and at odd times and in which there are examinations. The many clubs, literary, debat-

ing and social, meet at night. Many of the most brilliant careers of English history began in these clubs. Oxford life is designed to bring the best culture of the ages to each man and to help him cultivate his particular gifts, thus assisting him in finding the place in life for which he is best fitted. In normal years the faculty numbers about 300, and the undergraduate student body about 3,000, but during the War of the Nations the number of undergraduates fell below 1,000.

Consult Corbin's *An American at Oxford*; Lang's *Oxford*.

OXIDATION, *ok si da'shun.* When oxygen combines with other substances so as to change the character of the original substance or to form entirely new compounds, the process is called *oxidation.* It may be slow or fast. When it is rapid and accompanied by heat and light, it is called *combustion,* in which case the substance burns. Slow oxidation is one of the life processes of the body. It is the gradual burning of the tissues of the body, thus keeping the body warm and furnishing the energy for action. The rusting of iron, too, is oxidation, the rust being the red iron oxide formed. See OXYGEN.

OXYGEN, *ok'si jen.* The atmosphere is composed of about one part oxygen to four parts nitrogen, and the oxygen is the life-giving substance. It is a gas which enables animals to live and fire to burn. Because of its relation to life oxygen is sometimes called *vital air.* It is the most abundant simple substance or element in existence. It constitutes one-fifth of the atmosphere, about one-half by weight of all the rocks, and eight-ninths by weight of water. Oxygen is a little heavier than air, and without color, odor or taste. One can easily prepare it in the laboratory for experimental purposes, by heating in a closed retort a mixture of potassium chlorate and black oxide of manganese, and collecting the gas in inverted jars over water.

Experiments with Oxygen. The following simple and interesting experiments can easily be performed with oxygen. Since the gas is heavier than the air, it will remain for a short time in a jar with cover of glass or cardboard. The cover should be placed over the mouth of the inverted jar containing the gas and the jar then be lifted from its position over the water and set in place for the experiment.

1. Attach a match to a wire. Light the match and place it in the jar. Notice how much more brightly it burns than in the air.

2. Place burning sulphur in a jar of oxygen and notice the bright flame produced.

3. Dip the end of a wire or of an old watch spring in sulphur. Light the sulphur and place the wire in a jar of oxygen. The wire will burn and throw off brilliant sparks. At the close of the experiment the inside of the jar will be coated with oxide of iron (iron rust).

How Oxygen Supports Life. If an animal or a plant is deprived of air it dies. By respiration the air is drawn into the lungs; there it gives up a part of its oxygen to the blood, by which it is distributed to all parts of the body. The oxygen unites with the tissues, or *oxidizes* them, and in this way the heat is produced which keeps the body at a uniform temperature. Among the waste products formed during this process is carbon dioxide, which is expelled from the system through the lungs. Oxygen thus purifies the blood, and by a process of slow combustion (oxidation) of the tissues supplies the body with heat.

Plants, on the other hand, take in a large quantity of carbon dioxide through their leaves and give off oxygen, but this action takes place only under the influence of direct sunlight. These two great kingdoms, the animal and the vegetable, perform an important work towards keeping the supply of oxygen in the air constant. What the animal exhales the plant inhales, and what the plant exhales the animal inhales. One should not infer, however, that the proportion of oxygen in the atmosphere is maintained wholly as a result of this relation of the animal and vegetable kingdoms.

Uses of Oxygen. Oxygen forms many combinations in nature, and without it many common processes would be impossible. Fires would not burn, and many substances, such as iron and steel, could not be produced; but the pure gas was not until recently considered to be of any practical use. Formerly it was supposed that, if one should breathe pure oxygen, he would burn his life out in a short time. We now know that this is not a fact, and oxygen is frequently used to restore a person who has been suffocated, or one who is unable to obtain enough air, as in cases of pneumonia, asthma and croup. Divers now carry tanks filled with oxygen under pressure, and without it the submarine could remain under water only a short time.

For commercial purposes oxygen is stored under strong pressure in iron cylinders. When mixed with hydrogen in proportion of one part hydrogen to two of oxygen and burned at the mouth of a tube with a small aperture, it forms an intensely hot flame. Under high pressure

and at a very low temperature oxygen can be liquefied. For commercial purposes it is made from liquid air. It was discovered by Priestley in 1774.

Consult Benedict's *Composition of the Atmosphere, with Special Reference to Its Oxygen Content.*

Related Subjects. In connection with this discussion of oxygen the reader is referred to the following articles in these volumes:

Carbonic-Acid Gas	Fire
Chemistry, subhead	Hydrogen
Elements	Rust
Combustion	

OYAMA, *o yah' ma,* Iwao, Prince (1842-1916), a Japanese field-marshal and statesman, commander-in-chief of the Manchurian forces during the Russo-Japanese War, was born in Kagoshima, the second son of a samurai of Satsuma. He was sent to Europe to observe the progress of the Franco-Prussian War, and upon his return home rose through merit to the rank of lieutenant-general. In 1880 Oyama held the portfolio of Minister of War, and was made chief of staff in 1882. A second trip to France and Switzerland for the purpose of studying military tactics was taken from 1883 to 1885. Oyama received the title of count, and later that of general, and of privy councillor.

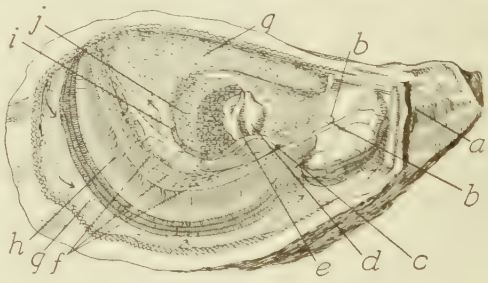
During the Chinese-Japanese War (1894-1895) he commanded the second army corps, and after severe fighting occupied Kinchow, Port Arthur and Wei-hai-wei—the three powerful strongholds of China. In recognition of these services he received the title of Marquis and the order of the Grand Cordon of the Rising Sun. Three years later (1898) Oyama was promoted to the highest military rank, field-marshal. In the Russo-Japanese War he was commander-in-chief of the Manchurian army, and the great victories of the Japanese forces were largely due to his tactics. In 1906 Oyama received the British Order of Merit, and the following year the Mikado bestowed on him the rank of prince. He was also decorated with the Grand Order of the Chrysanthemum.

OYSTER, *ois' ter.* A schoolgirl, required in an examination to give a definition of oyster, wrote, "An oyster is a mushy substance enclosed in a shell." A great many people might regard this as an entirely adequate definition, for it is difficult to think of the headless, limbless and speechless oyster as an animal, or, in fact, as anything but a soft substance that, when served on the half-shell, is a delicacy which has few equals. But this same "dumb" oyster, though it is meagerly equipped with special senses and has no brain at all, is more valuable to man than any other single product of the fishing industry, and the ten billion or so of oysters produced in the world every year provide food for the people of at least twenty-five countries.

Description. Among the subdivisions of the animal kingdom the oyster is classed as a *mollusk* (which see), a group containing animals with soft, fleshy bodies covered usually by shells. The oyster is a denizen of salt waters, thriving best in quiet, shallow inlets. As this stanza of an old song puts it—

> The herring loves the open sea,
> The mackerel loves the wind;
> But the oyster loves the quiet tide,
> For it comes of a gentle kind.

The shell of the oyster, which forms a little house for it to live in, consists of two parts called *valves,* which are fastened at one end by a hinge. By means of a strong *adductor* muscle, which attaches the soft body to the shell, these valves can open (about half an inch) and shut as the inmate desires. In its



PARTS OF THE OYSTER

(*a*) Hinge
(*b*) Ganglia of the nervous system
(*c*) Blood vessel from gills to auricle of heart
(*d*) Ventricle
(*e*) Auricle
(*f*) Pores from which water issues into bronchial canals after passing through gills
(*g*) Mantle (arrows show direction of current produced by cilia)
(*h*) Gills
(*i*) Outline of organ of Bojanus, the so-called kidney
(*j*) Adductor muscle

natural state the oyster rests on the left valve, which is larger, thicker and more convex, or hollowed out, than the right one. Usually it attaches itself by this left valve to a rock or other object on the sea bottom, remaining fixed for life, and sometimes several oysters lie fastened to one another. If it so happens that there are too many in one group, or bed, the under ones may sink into the mud and die of starvation and suffocation.

Every oyster-shell is lined with a fold of muscle called a *mantle,* which grows from each

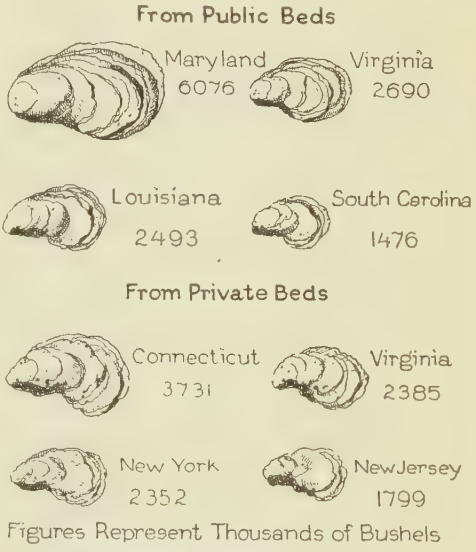
side of the body. The limy substance which makes up the shell is secreted in layers by the mantle, that on the inside being called *mother-of-pearl* (which see). Anyone who examines the outside of an old oyster-shell can see the succession of layers overlapping, like shingles on the roof of a house. As each layer represents a season's growth, scientists judge an oyster's age by the thickness of the shell. It is claimed that oysters, if left undisturbed, may live to be 100 years old. Sometimes a grain of sand or other hard object becomes lodged on the inside of the shell. In such cases, to protect its soft body from irritation, the oyster secretes mother-of-pearl over the object and in due time a pearl (which see) is formed. The oysters that are famed as pearl makers, however, are not the edible species of the north temperate zone, but are found in the tropics.

Although the oyster has no head, being all body, it has a mouth, consisting of a funnel-shaped opening at the narrowest part of the body. This mouth is provided with minute, fingerlike projections, which select from the sea water the myriad plant and animal organisms on which the oyster feeds. In the breeding season it has no scruples about eating its own eggs, to say nothing of the "small fry." However, as a female oyster produces on an average at least 9,000,000 eggs in a season, one may excuse this seeming lack of parental instinct. This interesting animal has a good-sized stomach, which is connected with the mouth by a short gullet; two pairs of gills for breathing, an intestine, a dark-green liver, a two-chambered heart and an elementary nervous system, but is minus ears, nose and eyes. It also lacks the footlike appendage that many mollusks possess, for the very good reason that it has no need of an organ of locomotion.

How It Grows. Oyster eggs are yellowish in color, and so minute that a mass of them would look like so much thick cream. They are ejected from the parent oyster in a sort of milky spray. A newly hatched oyster is a cup-shaped object about the size of the point of a needle; it is able to swim about freely by means of fine, hairlike growths, or *cilia*. Soon the primitive shell is formed, and the little animal sinks to the bottom of the sea and attaches itself to a solid object, to develop into a real oyster. In a month a young oyster is about the size of a pea; at the end of a year it is as large as a silver quarter; and after that it grows about an inch a year until it reaches full size at the end of three or four years.

So many other animals prey upon oysters that they would become extinct if such countless numbers of eggs were not produced. When the swimming larvae reach the surface they are gulped down by fish at the rate of several thousands a second, and after they begin life as fixed objects on the sea floor they are attacked by starfish, drills, rays and other hungry marine enemies. Among these is the boring snail, which pierces the shell with its rasping tongue and proceeds to draw out the soft parts at its leisure. One scientist has figured that a newly-hatched oyster has one chance in 1,145,000 to attain adult size.

The Oyster Industry. The popularity of the oyster as a table food is responsible for an industry of gigantic proportions. The oyster beds of the coast waters of Eastern United States, especially those in Chesapeake Bay, are among



THE ANNUAL CATCH

The figures represent the average yield for a period of five years.

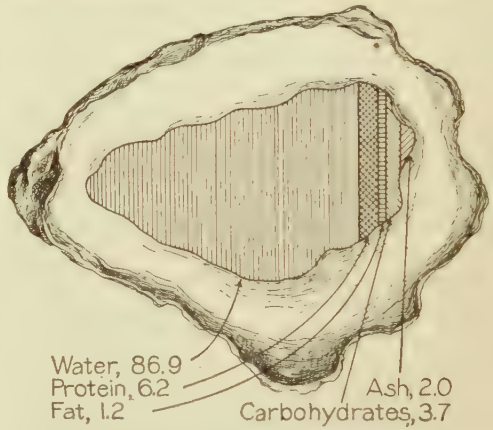
the most productive in the world. In America, oyster fishing is carried on from Maine to Florida, in the Gulf of Mexico, in San Francisco Bay and in the coast waters of Oregon and Washington. Baltimore is the chief market for the industry, and the Chesapeake Bay district is the most extensive single area producing oysters. Maryland, Virginia, Connecticut, Louisiana, New Jersey, New York, South Carolina, Georgia and Rhode Island annually produce over 1,000,000 bushels each; the total catch for the entire country has for many years been over 30,000,000 bushels a year, valued ap-

proximately at $15,000,000. Maryland and Virginia together produce annually nearly 12,000,000 bushels, from both public and private beds. The oyster industry is by far the leading branch of the fisheries of the United States. Oysters from private beds form less than half of the total yield, but because these beds are better taken care of than the public areas their catch is of superior quality and therefore more valuable. In some cases ownership of private areas lies in the state, in others the beds are the private property of landowners who have holdings on the coast.

The most important oyster beds of Canada are in the Gulf of Saint Lawrence and off the coast of British Columbia. In 1915-1916 the total output for the Dominion reached 21,386 barrels, the market value of which was $147,628. The European oyster occurs from Italy to Norway, the annual value of the industry for the different countries being approximately as follows: British Isles, $774,000; France, $3,584,000; Holland, $422,000; Italy, $220,000; other European countries, $201,000. The oyster industries of Asia, Africa and Oceania have a combined yearly value of about $557,000. In round numbers the value of the world's yield is $20,000,000 a year.

Oyster Culture. In many places the natural beds have been so depleted that it has been found necessary to resort to artificial methods of production. Frequently the beds are devoted to the cultivation of the free-swimming larvae, a bed so employed being known as an oyster farm. These oyster-rearing areas are marked off carefully by buoys, that each "farmer" may distinguish his own plot. The farm must have a stable bottom, for loose, shifting sand or deep, soft mud is liable to cover and smother the young oysters, called *seed* oysters. Objects to serve as lodging places, such as clean shells and tiles, are placed on the sea floor before the seed is planted. Oyster culture has become an important occupation both in the United States and in Europe.

Catching and Marketing. In middle latitudes the oyster harvesting season occurs during the fall and winter. (The spawning season in Chesapeake Bay lasts from April to October.) In shallow waters the shells are scooped up from the sea with huge tongs or pincers, that open and shut like shears, but in deeper waters the catch is obtained by means of great dredges operated by hand or steam power. The business of preparing oysters for the market requires thousands of workmen. Oysters that are to be shelled, or "shucked," are placed with the edge of the shell on a chisel blade, which is fixed on a block. With a sharp blow from a wooden mallet the shucker cuts the shell through, and then, slipping a broad-bladed knife into the gap, he lays the two valves out flat. The muscle which joins the fleshy body to the shell is next severed, and the naked oyster is ready to be washed and packed for shipment. Unshelled oysters are also marketed in large quantities, as there is a wide demand for



COMPOSITION OF THE OYSTER

As a heat producer the oyster is not a desirable article of food. Its fuel value is 230 calories per pound, and this is but little greater than that of many vegetables—about the same as onions, nearly twice that of cabbage, but only one-fourth as great as peas or beans.

oysters served raw on the half-shell. Usually they are free from infection, but the practice of placing oysters in fresh water for the purpose of "plumping them" is sometimes attended with danger, as typhoid and other germs may be introduced thereby. As to the season for buying oysters, one should bear in mind the saying—"It is unseasonable and unwholesome in all months that have not an R in their names, to eat an oyster."

Food Value. As shown in the accompanying illustration, besides water, protein, fat and ash, which are found in all meats and food fish, the flesh of oysters contains over three per cent of carbohydrates (starches and sugars). On an average, there is about the same quantity of nutritive substances in a quart of oysters as in a quart of milk, or two pounds of fresh codfish, or a pound of bread or three-fourths of a pound of beef. Raw oysters, seasoned with salt, pepper, lemon, ketchup or other sauce, are an excellent appetizer and a popular delicacy with which to begin a dinner. Oysters are also nutritious and tempting when served in soups,

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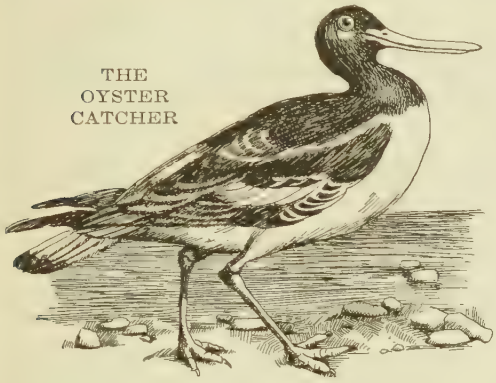
THE OYSTER INDUSTRY.

Acres of oyster beds at Cancale, France.

when broiled, fried or escalloped, or when used in turkey dressing. B.M.W.

Consult Brooks' *The Oyster: Summary of a Scientific Study;* Moore's *Oysters and Methods of Oyster Culture.*

OYSTER CATCHER, a wading bird, native to seacoasts in most warm sections of the globe. Its name refers to its sharp-edged bill, used in opening shellfish, clams, oysters and other mollusks, which form its food. It is a



THE OYSTER CATCHER

skilful diver and has strong powers of flight. Oyster catchers make no attempt at nest-building, but deposit their three or four eggs, which are buff, marked with dark brown, among the bare pebbles.

OYSTER PLANT, or **SAL'SIFY,** a biennial garden vegetable, cultivated for its roots, which when cooked have a little of the flavor of oysters, hence the name. It is a native of Europe, but has been domesticated in America, grows to a height of four feet, bears showy, purple flowers and thrives in deep, rich soil. The roots make a palatable food; to prepare them they are allowed to stand in cold water until the outer fiber is softened, then scraped, cut into small pieces and cooked until tender, after which they are drained, creamed in the ordinary way and seasoned with butter, pepper and salt. When raw, they will keep in good condition in cool, moist places.

OZARK, *o'zahrk,* **MOUNTAINS,** an irregular range of hills extending from the southern part of Illinois into Missouri, then down into Arkansas and Oklahoma. They belong with the oldest mountain regions in the world, and vary from 1,500 to 2,000 feet in altitude, the highest point being Pilot Knob, in Iron County, Mo. They are covered with timber, and the mineral deposits, which include lead, coal and iron, are very extensive. Many valleys rich in cereals, fruit and live stock penetrate different parts of the group. The Ouachita Mountains, south of the Arkansas River, are a continuation of this group.

OZONE, *o'zohn,* from a Greek word meaning *I smell,* is a form of oxygen, but is more active and concentrated than that element, and has an odor resembling chlorine. It is thought to be present in the air, especially in the country or by the sea, but about cities it is always changed to ordinary oxygen by the action of the smoke and gases which are constantly escaping. It is this idea that makes people think of pure air as ozone.

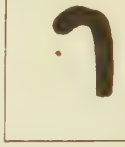
OYSTER PLANT
(*a*) Root; (*b*) fruit; (*c*) stalk and flower.

Three volumes of oxygen are condensed to two when ozone is formed. It is frequently made in small quantities when oxidation takes place, but most of the ozone thought to be present in the air is formed by electrical discharges. It is particularly noticeable immediately after a thunderstorm. It is one of the most powerful oxidizing agents known; it bleaches dyestuffs and indigo, and is used as a germicide for sterilizing water. It is easily changed back to ordinary oxygen by heat. See OXYGEN.

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE

Pp

P is the sixteenth letter of the English alphabet. It comes from the Phoenician *pe,* through the Greek and Latin, but the form has changed considerably. The Phoenician name meant *mouth,* but there is little in the vertical line bent to the left at the top which particularly resembles that feature. The Greeks changed the form, and the Romans altered it still further, making of it the modern capital *P.*



In sound it has remained constant, having possessed always the explosive character which it has to-day. Occasionally it is silent, as before *s* and *n* in such words as *psalm, pneumonia,* and it is used in one common combination, *ph.* This is really an unnecessary digraph, as *f* represents the same sound, and some words are correctly spelled in either manner, as in *fantasy, phantasy.*

PACIFIC, *pa sif'ik,* **OCEAN,** the greatest of the oceans, a body of water so vast that it occupies more than a third of the entire area of our planet and comprises about half its water surface. It lies between America and Asia and Australia, and sweeps from the Arctic on the north to the great ring of shoreless water known as the Southern Ocean. A happy accident gave it its poetic name. Moderate winds favored Magellan on his first cruise, and the name *Pacific,* which he chose, records his own impression of its peaceful aspect. As a matter of fact, however, this ocean is not more free from storms than the Atlantic.

The area of the Pacific has been estimated at about 70,000,000 square miles. It is broadest at the equator, where it measures 10,000 miles from east to west. Its greatest length from north to south is about 7,350 miles. Its depth is greater than that of the Atlantic, the average reading being about 2,530 fathoms (15,180 feet). The deepest place thus far discovered is near Mindanao, one of the Philippines, the soundings showing a depth there of 32,088 feet, or more than six miles. There are seven other places in the Pacific where the soundings show over 30,000 feet.

The bed of this ocean may be regarded as a sunken plain, dotted here and there, especially in its western part, with plateaus, volcanic islands, coral reefs and atolls. Some of the plateaus emerge to form islands like Australia.

Thou wert before the Continents, before
The hollow heavens, which like another sea
Encircles them and thee, but whence thou wert,
And when thou wast created, is not known,
Antiquity was young when thou wast old.
STODDARD: *Hymn to the Sea.*

The circulation of currents, which is produced by the action of the wind, is precisely similar to that in the Atlantic, but on a more impos-

ing scale. The Black Stream of Japan corresponds to the Gulf Stream. In the South Pacific the Humboldt Current, which flows northward along the west coast of South America, corresponds in a general way to the Benguela Current of West Africa. The area of the trade winds is less clearly defined than in the Atlantic. The northeast trade wind remains throughout the year within the northern hemisphere, but the southeast trade wind advances beyond the equator. In the China Sea typhoons are frequent.

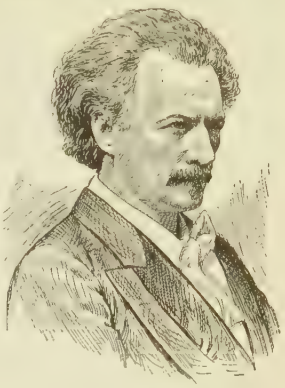
The American shore line is fairly regular, being broken by only one considerable gulf—that of California. On the west, it is much more uneven, being broken by such gulfs as the China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, etc. Balboa discovered the Pacific in 1513. Magellan was the first European to sail across it (1520-1521). He was followed by such adventurers as Drake, Tasman, Bering, Anson, Cook and Vancouver. For comparisons of the oceans, see the article Ocean.

Related Subjects. The reader is referred to the following articles in these volumes:

Atoll	Ocean
Balboa, Vasco Nunez de	Trade Winds
Magellan, Ferdinand	Typhoon

PADDLEFISH, *pad''l fish,* a family of fish consisting of two species, found in the fresh waters of China and of the United States. The American paddlefish inhabits the streams of the Mississippi Valley between Texas and Louisiana on the south and Minnesota and Wisconsin on the north. It is of unusual size, an average specimen being three feet long and weighing thirty pounds; those weighing up to 160 pounds are sometimes caught. The smooth, greenish skin of the paddlefish is lacking in scales, and its snout is expanded into a long, paddlelike blade. With this blade it stirs up the mud at the bottom of streams in search of food. Its flesh is sometimes smoked and sold as sturgeon, for it has a flavor resembling that of sturgeon flesh. It is the roe of the paddlefish, rather than its flesh, however, that gives it its chief value, for from the eggs is made a good quality of caviar. Paddlefish have much the same habits as catfish (which see) and are sometimes called *spoonbill cats.*

PADEREWSKI, *pah deh ref'ske,* Ignace Jan (1860-), a pianist and composer, born in Podolia, Poland. After becoming world famous in his art, he abandoned music, at least temporarily, in his old age to help his suffering country erect a republican form of government in the new Poland, which was given its independence after the War of the Nations. In the provisional government he became Premier for a year. To the music-loving public, however, he will be best remembered as a master pianist. He studied at Warsaw and Berlin, and at length became an advanced pupil under the famous Leschetizky, at Vienna. He was but eighteen years old when appointed professor of music at Warsaw Conservatory and not quite twenty-four when given a similar position in the Conservatory of Strassburg.



IGNACE JAN PADEREWSKI

In 1887 he began his career as a solo pianist and three years later aroused such enthusiasm in London that his audiences often had to be quieted by the officials of the theaters. During the next year he won similar success in America and since then has been considered possibly the greatest of living pianists. In 1895-1896 he made a three-month tour in the United States by which he earned about $200,000. In 1899 he married Baroness de Rosen, and afterwards spent much of his time on the great Polish estate which the large fortune gained from his concert tours enabled him to buy. After 1901 he appeared in public concerts but seldom, and then generally confined his playing to his own compositions. Among the best of these are the short compositions, *A Love Song* and *Night Song.* In 1902 his opera *Manru* was produced at the Metropolitan Opera House in New York, he himself conducting. It was very favorably received, but aroused no great enthusiasm among the critics. After the devastation of Poland, in 1915, in the War of the Nations, Paderewski and his wife, by concerts and personal pleas, raised large sums of money in America for the relief of the stricken peasants.

PAD'UA, the oldest city of Northern Italy, and capital of the province of Padua, is situated on the Bacchiglione River, twenty-two miles southwest of Venice. Probably no place in all Italy has more points of interest. It is a city of seven gates, and has narrow, crooked streets, many of them lined with arcades; several high Roman bridges cross the various arms

of the river, and there are numerous medieval palaces and churches. Its art treasures perpetuate the memory of some of Italy's greatest masters—Donatello, Guido Reni, Canova, Giotto, Fra Filippo Lippi and others. In its famous university, founded in the thirteenth century by Emperor Frederick II, Galileo lectured for eighteen years. When the War of the Nations broke out in 1914 over 1,500 students were in attendance there. A celebrated Botanic Garden, the oldest in Europe, is connected with the university.

Padua claims to have been founded several centuries before Christ, by the Trojan hero Antenor. Under the Romans it was the most important place in the north of Italy and, like other cities of that country, had an exciting history throughout the Middle Ages. Livy was born in Padua, and at one time it was the residence of Dante. At the present time it has considerable industrial importance, possessing a flourishing automobile factory and other manufacturing establishments. There is also a prosperous trade in fruit, grain, oil, wine and cattle. Population of city and suburbs in 1915, estimated, 105,135.

PADUCAH, *pa du' ka,* Ky., one of the largest markets in the United States for dark leaf tobacco. It is situated on the extreme northwestern border of the state, in McCracken County, of which it is the county seat, and on the Ohio River at the point where it receives the waters of the Tennessee River. Cairo is thirty-eight miles west, by water. Transportation is provided by the Illinois Central, the Nashville, Chattanooga & Saint Louis and the Burlington railways, and steamboats connect Paducah with all river ports on the Mississippi, Ohio and Tennessee rivers. In 1910 the population was 22,760; in 1920 it was 24,735.

The city is located in a rich agricultural, timber and mineral region. Large capital is invested in the lumber and tobacco interests in Paducah, and the wholesale trade is extensive. The leading industrial plants make tobacco products, and other establishments produce lumber products, cordage, clothing and pottery. There are in addition boat-building yards and the machine shops of the Illinois Central Railway. Noteworthy structures are the United States government building, the municipal buildings and the City National Bank building. Saint Mary's Academy and a Carnegie Library supplement the public and parochial schools. Two hospitals are maintained, one by the city and one by the Illinois Central Railway.

The first settlement on this site was made in 1809; it was named in honor of the Indian chief Paduke. The village was incorporated in 1828, and in 1856 the city charter was granted. In September, 1861, during the War of Secession, Paducah was occupied and fortified by General Grant, and in March, 1864, the garrison of 800 men under General Hicks successfully resisted an attack by 5,000 men under General Forrest. The commission form of government providing for a mayor and four commissioners was adopted in 1913.

PAGANINI, *pah gah ne' ne,* Niccolò (1782-1840), sometimes referred to in musical history as the greatest of all violinists, was born at Genoa, Italy. He received music lessons from his father before he was six years old and later was taught by the best instructors in Genoa. In 1795 he went to Parma, Italy, to study, but the teachers there told him they could do nothing more for him. He then commenced a course of self-training so rigorous that he often played fifteen hours a day. In 1797 he began his concert tours, which for many years consisted of triumph after triumph. His playing of tender passages was so beautiful that his audiences often burst into tears, yet he could perform with such force and velocity that at Vienna one listener became half crazed and declared for some days that he had seen the devil helping the violinist.

While engaged in the concert field Paganini had become devoted to gambling and lost so much that in 1800 he had to pawn his valuable violin. From 1801 to 1804 he lived in Tuscany with a wealthy woman who was violently in love with him, but after the latter year once more began his tours and earned a great deal of money. For some years he was musical instructor to Napoleon's sister, the princess of Lucca, but in 1815 removed to Venice, where for thirteen years he lived a rather loose life in the company of a beautiful dancer. His playing, however, gained him greater fame each year. In 1831 he appeared in London, where such crowds of admirers surrounded him in the street that mounted guards were given him as an escort. His profits in England during six seasons there were $85,000, and this sum was probably exceeded in his French tours. Hard work and dissipation impaired his health so that his last years were spent in much physical suffering at his villa near Parma. In spite of the fact that after his retirement he lost large amounts in gambling he left $400,000 to his son by the Venetian dancer. He bequeathed his

violin to the city of Genoa, where it is still carefully preserved.

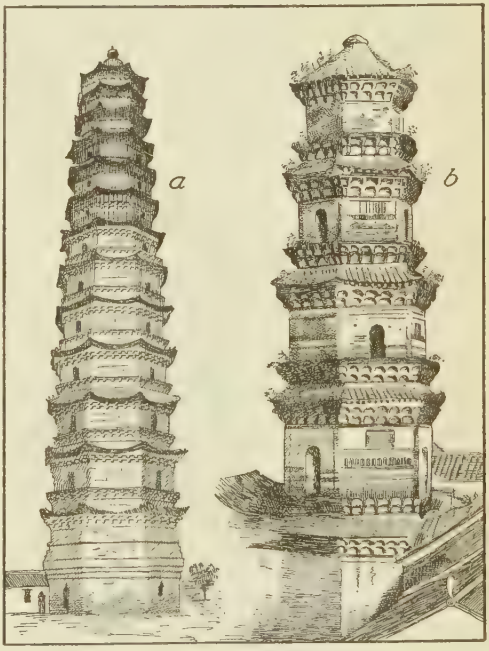
PAGE, David Perkins (1810-1848), an American educator, whose *Theory and Practice of Teaching, or the Motives of Good School Keeping,* was for many years after its publication the most influential work in the world relating to pedagogy. He was born at Epping, N. H., studied for two terms at the Hampton Academy, and then began to teach. His preparation had been inadequate, but he was a born teacher, possessing to an unusual degree the power of inspiring his pupils with a desire to learn, and when the Albany Normal School was founded in 1845 he was made its principal. This position he held until his death, three years later.

PAGE, Thomas Nelson (1853-1922), an American novelist and story-writer, born at Oakland, Va., of a family prominent in the history of the state. He graduated from Washington and Lee University and from the University of Virginia Law School; practiced law for eighteen years in Richmond, Va., and in 1893 removed to Washington, D. C., where he devoted himself to literary pursuits. His stories, almost without exception, are of life in the South, and his pictures are usually sympathetic and accurate. *Marse Chan,* his first successful story, deals with a subject which is prominent in many of his tales—the affection between master and slave. It was republished with other tales, including *Meh Lady and Unc' Edinburg's Drowndin',* in a volume entitled *In Ole Virginia.* His best-known novels are *Red Rock, Gordon Keith, Bred in the Bone* and *John Marvel, Assistant.* Besides these, he has written dialect poetry and a number of essays, the latter dealing with the present negro problem. From 1913 to 1919 he was ambassador to Italy. In 1921 he published a notable volume, *Italy and the World War.*

THOMAS NELSON PAGE

PAGE, Walter Hines (1855-1918), an American editor and diplomat, born at Cary, N. C. He was educated at Randolph-Macon College and Johns Hopkins University; in the latter he held a fellowship from 1876 to 1878. After filling various editorial positions on North Carolina papers, he became editor of *The Forum* in 1890 and after serving in this position for five years went to the publishing firm of Houghton, Mifflin & Company as their literary adviser. In addition to this work he was editor of *The Atlantic Monthly* from 1896 to 1899, when he resigned to become a partner in the publishing house of Doubleday, Page & Company. In 1900 he founded *The World's Work,* and was its editor-in-chief until his appointment by President Wilson in 1913 as ambassador to Great Britain, to succeed Whitelaw Reid, deceased. He served with distinction through the trying years of the War of the Nations, resigning in August, 1918, because of overwork and ill health.

His magazine articles and editorials have given him fame through their remarkable grasp of contemporary economic and social conditions and their fair and just treatment of disturbing questions, and as ambassador he made a creditable record during a critical period in his country's history. He is author of *The Rebuilding of Old Commonwealths.*



TWO CHINESE PAGODAS

(*a*) Famous pagoda built of glazed tile and porcelain. (*b*) A typical pagoda set in the midst of low-roofed buildings; trees and shrubs are growing in the successive roofs.

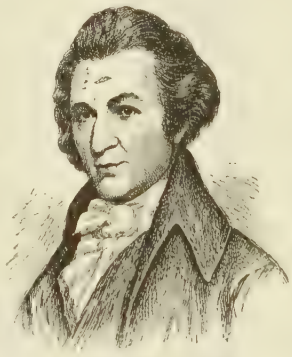
PAGODA, *pa go' da,* a word which in modern use has lost much of its original meaning. In reality *pagoda* is the name of that part of

a Buddhist temple corresponding to the tower of a Christian church. In common use it has come to mean almost any Eastern religious building, and is applied to peculiar-shaped Chinese and Japanese temples, though the word did not originate in either of those countries. There are probably 2,000 pagodas in China, most of them built between the years 1368 and 1644.

The pagoda of the Indian buddhist temples is generally a remarkable specimen of architecture, and is above the entrance or immediately above the inner sanctuary. The pagoda is not the temple itself but merely an outside decoration, in many cases a decoration of almost priceless value.

The Persian Butkadah, often erroneously spoken of as a pagoda, is usually a memorial building, and may or may not be connected with a temple or religious building. In China the pagoda, or really the *peh-kuh-ta,* is a tower, generally of great beauty, and decorated with costly carvings of ivory, bone and stone work. In England the word has been degraded into common use as the name of restaurants and tea shops in the same way that the word *kiosk* in Paris has come to mean simply a news stand.

PAINE, Thomas (1737-1809), a political and philosophical writer born in Norfolk, England. After attempting various occupations, among them those of stay maker, exciseman, preacher and tobacconist, he removed in 1774 to America, influenced by Franklin, with whom he had become acquainted. While employed as editor of the *Pennsylvania Magazine* in 1776, he became suddenly prominent through the publication of his pamphlet entitled *Common Sense,* in which he advocated complete independence for America and the establishment of a republican government. The reputation which he thus acquired with the radical element grew with the publication, at intervals throughout the war, of a series of pamphlets called *The Crisis.* He was made secretary, in 1777, to the committee on foreign affairs, but was dismissed two years later for making use of diplomatic secrets in his writings. As a reward for services which he had performed and that he might have leisure to devote himself to public affairs, he was given sums of money by Congress and by the state of Pennsylvania, and a farm at New Rochelle by the state of New York.



THOMAS PAINE
Possibly the most notable critic of the Bible that any country has produced.

Paine went to Europe in 1787, spent some time in France, and then crossed to England. While in England he published (1792) his *Rights of Man,* a reply to Burke's attack on the French Revolution. This made him exceedingly unpopular in England but won him great favor in France, whither he had gone after the publication of the pamphlet, and he was elected a member of the French National Convention. His opposition to the execution of Louis XVI offended the radical party in the convention, and he was excluded from that body and imprisoned. During his imprisonment he worked on the second part of his *Age of Reason,* the first part of which was published in London and Paris just after his arrest. On his release he regained his seat in the Convention. In 1802 he returned to the United States, and from that time until his death took little part in public affairs. While his early efforts in the patriotic cause won him the gratitude of the Americans, his attack on religion in the *Age of Reason* alienated many of them. This work, while it in some places attains real eloquence in its pleas for morality, is in its ridicule of religion as revealed in the Bible both unscholarly and misleading. It was once very popular, but is no longer widely read.

PAINT. We paint the exterior of our houses to protect them from the weather and to improve their appearance, and we paint their interiors to make them more beautiful. The two great purposes for which paint is used are protection and ornamentation.

Paint consists of a coloring matter called a *pigment* mixed with a liquid called a *vehicle.* Most pigments are mineral substances, such as white lead; zinc white; ocher, which consists of clay colored with an oxide of iron; the lead chromate and cadmium compounds, which are yellow; the lakes of various colors, consisting of some such mineral substance as clay colored with a dye; compounds of cobalt, which produce blue; and umber and sepia, which are brown. Carbon, in the form of lampblack or boneblack, forms the basis of black paints. Indigo comes from a plant, and cochineal, from which carmine is obtained, from an insect.

Linseed oil is the vehicle most widely used for oil paints. The oil is usually heated to a high temperature and a small quantity of lead oxide is added. The "boiled oil" thus produced dries quicker than the "raw" or unboiled. An oil paint contains a *solvent,* usually turpentine, to make the color spread easily, and a *drier,* usually a compound of lead and manganese, to hasten the drying process. Paints mixed with water are called *water color* paints. They are used for decorating interiors. Usually a small quantity of glue or dextrin is added to the mixture to make the paint stick. Calcimine is a good example of this class of paints.

Fireproof paint contains boric acid or powdered glass which is melted by the heat and forms a protective glaze. Luminous paint contains some compound of phosphorus. See article Oils, in these volumes, page 4357.

PAINTING. We all love pictures for the pleasure and inspiration they give us. An illustrated book is more attractive than one without illustrations, not alone because the pictures may clarify the text, but because they add an element of beauty which the writer cannot express in words. A picture, if it is a work of art, tells a story so that we feel it; that is, beauty is experienced through the emotions more than through the senses of sight and hearing, and this is why a genuine work of art appeals so strongly to us. It seems to create a new atmosphere, in which, for the time, we live apart from the world of realities and care.

Some people can see beauty everywhere. They are conscious of it continually. The gift of such perfect instinct for beauty comes by nature to a few; it can, however, be cultivated by almost everyone, and one of the benefits derived from great pictures consists in their cultivation of this instinct. Many of us have overlooked the beauty that lies at our door until some great artist has revealed it to us in a picture.

Painting concerns itself as much with the world of fancy as with the world of fact. In pictures by real artists fact and fancy are so skilfully combined that none can tell where one ends and the other begins. "A picture is not really the representation of a thing, but the representation of the beauty of the thing, and when it expresses the soul of it, as it were, and not the mere lineaments, then, logically or illogically, art claims it as its child." The artist is more than a mere painter; he is one who "fits some beautiful conception with some beautiful expression." He is engrossed not only with form and color in themselves; his chief concern is to make these elements so express his ideal that it will live in the hearts of men. All great painters have been more than masters of their art; they have been intellectual masters as well. Of Raphael, Whittier said—

> Around the mighty master came
> The marvels which his pencil wrought,
> Those miracles of power whose fame
> Is wide as human thought.

Study of a Picture. Since concrete illustration is of far greater worth than mere verbal explanation, the reader who desires help in the study of pictures is asked to consider the following analysis of the *Song of the Lark,* by Breton, a reproduction of which is found in this work, facing page 916. The plan should be studied with the picture before the reader.

1. *The Theme.* Day is dawning over the fields of Artois. The rising sun is calling the laborers to the harvest field, and just as it appears above the horizon this strong young peasant girl sets forth from her humble cottage to take her place in the ranks of the harvesters. As she treads her solitary path in the soft morning light, a flood of melody bursts upon her ear. Enraptured, she pauses a moment and gazes upon the lark whose heavenly message will lighten her heart during the long hours of toil. She is a simple country girl and her knowledge of nature has been derived from her contact with the fields and woods. Responding to the message, she drinks in the beauty of the world about her, and seems to raise to heaven a silent hymn of praise for the mere ecstasy of living.

Musical cherub, soar, singing, away!
Then when the gloaming comes,
Low in the heather blooms
Sweet will thy welcome and bed of love be!
Emblem of happiness
Blest is thy dwelling place—
O, to abide in the desert with thee!—Hogg.

2. *Composition.* By composition is meant such an arrangement of the objects in the picture as will clearly and forcefully express the theme, or the artist's idea.

The girl, silhouetted against the sky and field, is the dominating feature of the picture, but the lark is the center of interest. The hazy horizon and the soft light tell that the hour was at the break of day, and the entire setting is planned to lend emphasis to the bird and its morning song. The depth of sky gives the effect of lofty flight; the houses in the background show that the girl has come from the village and the foreground is a field of stubble from which the harvest has been gleaned.

Every line of the figure of the girl is indicative of strength, endurance and buoyancy. Though her task is long and hard, she is not overcome by it. Her countenance is expressive of hope and happiness, and, cheered by the song of the lark, she goes forward to her daily toil with a light heart. Notice the simplicity of the figure, and how by a few lines and the use of well-chosen colors the artist has brought out this idea.

3. *Purpose and Message.* No real artist paints for the mere purpose of making a picture. The picture is to him the means of conveying a message to the world. What message did Breton wish to convey? Before we can answer this question we need to know something of the artist's life and tastes (see Breton, Jules Adolph). Breton loved nature and the French peasantry, whom he sought to idealize in his paintings. Someone has said that his peasant women are too beautiful for the fields, but they reflect his own attitude towards them, and the message he has brought to the world through these ideals is, that it matters not how humble the task or how irksome the toil, one may rise above it and go to his task with a song of joy in his heart.

In the main this plan can be applied to the study of any picture. It needs variation only in its details. The great questions to ask and answer are: What did the artist express in the picture? How did he do it? What message does the picture convey to me? What benefit have I derived from its study?

History of Painting

Early Beginnings. Pictures were first made to assist in the description of objects. Figures traced upon rocks in caves and those found on monuments that had been buried for ages tell us that this crude sort of picture making began very early in the history of the race. The Egyptians, Babylonians, Greeks, Romans and other ancient nations all had their systems of art in which painting was more or less prominent. But the paintings of these early periods and those of the first centuries of the Christian Era are of little interest to the general reader, although they occupy a position of importance in the history of painting.

The Medieval Period. Painting in the medieval period was an adjunct of architecture and was employed for both decoration and illustration. With the rise of Christianity painting gave its services to the Church, under whose dominating influence it remained for more than a thousand years. For centuries its chief purpose was to give religious instruction. Before the invention of printing (about 1425) only the priests and monks could read. Copies of the Scriptures were to be found only in monasteries, and this condition continued far into the sixteenth century. The walls of the churches were covered with scenes from the Bible, that the congregations might read in pictures the truths told from the pulpit.

These pictures showed a radical departure from the beauty of the Greek art, which the early Christians regarded as licentious and sinful in the extreme. Sad-faced Christs, melancholy monks and forlorn saints looked down upon the worshipers from the walls of every church edifice, and it was not until the fourteenth century that marked changes for the better began to appear. During the Renaissance (which see), 1400 to 1600, painting along with other arts made great progress.

Italy. In the thirteenth century a few Italian painters, stimulated by the influence of Gothic sculpture, began to break away from the old traditions and to make more lifelike figures. The great leader of this movement was Giovanni Cimabue. He was the first to give individual life, grace and movement to his figures; his draperies were less rigid, and on the whole his paintings were characterized by a naturalism heretofore unknown. With Giotto, his famous pupil, the revival of art was accomplished. He was the first master of real creative genius that Christianity had yet produced. He was a student of nature, big enough to break through the fetters of tradition, and by his daring naturalism he not only effected an entire change of the art of his time but influenced for centuries artists who followed him.

In the fifteenth century every branch of human knowledge began to be cultivated with a renewed vigor and enthusiasm. Painting, too, enjoyed its full and glorious share of the general activity. Foremost in the ranks of the painters of the Florentine School are Tommaso Guidi, better known as Masaccio, whose classic naturalism was adopted by the progressive artists of his time; Fra Angelico, who remained true to the traditions of Roman Catholic art and invested his Madonnas and angels with the cheerfulness, beauty and holiness which reflected the purity of his own life; Fra Filippo Lippi, the artist monk who imparted to his Madonnas a sensuous beauty and clothed his angels in gay Florentine garb. Perugino heads the list of the Umbrian School, the art of which was characterized by deep religious fervor. Venetian painting was later than Florentine in its development. Jacopo Bellini was the first great painter in Venice, but he was far surpassed by his more renowned sons, Gentile and Giovanni.

All these men were but the forerunners of the still greater artists of the next century, the Golden Age of Italian art. Instead of an expression of religious faith in painting we find now an expression of the highest worldly beauty. As Ruskin has pointed out, the painters chose a religious subject, not like the earlier Christian painters, for the purpose of touching men's hearts, but for the purpose of pleasing men's eyes. In the Florentine school of this period are the "divinely endowed" Leonardo da Vinci, painter, sculptor architect, engineer, and one of the earliest leaders in science, especially that which had a bearing upon art; Fra Bartolommeo, noted for his Madonnas; Michelangelo, supreme in painting, sculpture and architecture; and Andrea del Sarto, "the Faultless Painter" and great colorist. In the Roman School, a continuation of the Umbrian, Raphael Santi stands supreme. He is hailed as the "Prince of Italian painting." Parma boasts of Correggio, generally known as the head of the Lombard School, and without a rival in his delicate perception of the minutest gradations of light and shade. Painting in Venice now likewise burst into full bloom under the guidance of its worldly painters, whose brilliant, glowing tints are unsurpassed—Titian, the father of the modern art of coloring; Palma Vecchio, noted for his portraits of beautiful women; Tintoretto, like Titian, famed for his wondrous coloring; and Paul Veronese, who loved to paint banquet scenes. In the latter part of the sixteenth century came a decline in Italian art, due chiefly to the lavish imitation of the great masters of the preceding century.

Other Nations. During this period Flemish art reached a high degree of excellence. The brothers Van Eyck founded a school of painting whose influence extended to succeeding periods. They were the first to use oils successfully in mixing colors, and they introduced the landscape as a setting for their figures. Hans Memling added to the work of the Van Eycks by introducing a delicacy of finish in his landscapes and costumes that was far in advance of his time.

Albrecht Dürer was the greatest of the German masters of this period, and his work exerted a lasting influence upon German art. He was followed by Hans Holbein, the Younger, one of the world's greatest portrait painters.

The Seventeenth Century. Art critics regard the seventeenth century as the Golden Age of painting because during this century technical mastery of the art reached its highest degree of perfection. The most marked changes during the period consisted in the development of the landscape, and its use in the representation of scenes of common life (*genre*), the perfection of portrait painting and the change from mural decoration to small canvases or easel painting.

Italy. The decline in art which began in the sixteenth century extended far into the seventeenth in Italy. Two schools then came into prominence—the Naturalist, established in Naples, whose followers looked to nature for their inspiration and of whom Salvator Rosa was the leader; and the Eclectic School, founded in Bologna by the Carracci, who tried to follow in the steps of the masters who had just preceded them, and of whom Domenichino and Guido Reni were the most successful. By the beginning of the eighteenth century, Italian art had reached a mediocre level, and although Italy has shared to some extent in the modern revival of art, it has not been able to reach the high standard of the more northern nations.

Spain. Spanish art reached its highest development in the seventeenth century, the time of Velasquez and Murillo; the former was "the painter of earth;" the latter, "the painter of heaven." Many critics consider that the history of Spanish painting begins with the period when these two masters flourished. For a long time Spanish art was dependent upon Italian teaching. However, the license that characterized Italian art in the sixteenth cen-

ONE HUNDRED OF THE WORLD'S FAMOUS PAINTINGS

TITLE	ARTIST	TIME	SCHOOL	GALLERY	SPECIAL NOTE
Age of Innocence	Reynolds	1723-1792	English	National Gallery, London	Few pictures of children have been more widely reproduced.
Alice	Chase	1849-1916	American	Art Institute, Chicago	A charming portrait of a child.
Angelus, The	Millet	1814-1875	Barbizon	Privately owned	This was sold in 1890 for $150,000.
Assumption of the Virgin	Titian	1477-1576	Venetian	Venetian Academy	One of the "twelve great paintings."
Aurora	Guido Reni	1575-1642	Bolognese	Rospigliosi Palace, Rome	One of the "twelve great paintings."
Avenue at Middleharnis	Hobbema	1638-1709	Dutch	National Gallery, London	This beautiful avenue of trees has become very familiar through reproduction.
Battle of Bunker Hill	Trumbull	1756-1843	American	Art Gallery, Yale	Of great historical rather than artistic interest.
Beatrice Cenci	Guido Reni	1575-1642	Bolognese	Barberini Palace	One of the "twelve great paintings."
Blessed Damozel	Rossetti	1828-1882	English, Pre-Raphaelite		Portrait of the artist's wife.
Blue Boy	Gainsborough	1727-1788	English	Henry E. Huntington, American Railroad Official Chicago	A tall, manly boy, clad in blue satin.
Bringing Home the Calf	Millet	1814-1875	Barbizon		A picture of which children never tire.
Broken Pitcher	Greuze	1725-1805	French	Louvre	No artist surpasses Greuze in portraying the delicate beauty of a young girl.
Carmencita	Sargent	1856-	American	Luxembourg	A portrait of the famous Spanish dancer.
Carnation Lily, Lily Rose	Sargent	1856-	American	South Kensington Museum	A charming picture of two little girls lighting lanterns in a garden.
Charles I	Van Dyck	1599-1641	Flemish	Dresden Gallery	A dignified portrayal, which brings out the best in this unhappy king.
Children of Charles I	Van Dyck	1599-1641	Flemish	Berlin Museum	One of the world's masterpieces of child portraiture.
Children of the Shell	Murillo	1617-1682	Spanish	Prado Museum, Madrid	John and the infant Jesus are painted with all the sympathy of this master painter of children.
Christ in the Temple	Hofmann	1824-1902	German	Dresden Gallery	Familiar the world over in reproduction
Coming Storm, The	Inness	1825-1894	American	Art Institute, Chicago	A fine example of this "dean" of American landscape-painters.
Communion of St. Jerome	Domenichino	1581-1641	Italian	Vatican	One of the "twelve great paintings."
Creation of Man	Michelangelo	1475-1564	Florentine	Sistine Chapel, Vatican	A huge mural, accounted one of the greatest works ever conceived.
**Dance of the Nymphs*	Corot	1796-1875	Barbizon	Louvre	Exquisite in its misty, twilight effects.
Dante's Dream	Rossetti	1828-1882	English	Walker, Liverpool	Probably the painter's masterpiece.
Deer Drinking	Bonheur	1822-1899	French	New York Public Library	
Descent from the Cross	Rembrandt	1607-1669	Dutch	Hermitage, Petrograd	Though many artists used this theme, Rembrandt's painting is thoroughly original.
Descent from the Cross	Rubens	1577-1640	Flemish	Antwerp Cathedral	One of the "twelve great paintings."
Descent from the Cross	Volterra	1509-1566	Italian	Church of S. S. Trinita de Monti, Rome	One of the "twelve great paintings."
Distinguished Member of the Humane Society, A	Landseer	1802-1873	English	National Gallery	This great Saint Bernard dog was a subject worthy an artist's brush, and Landseer did it full justice.

ONE HUNDRED FAMOUS PAINTINGS—*Continued*

TITLE	ARTIST	TIME	SCHOOL	GALLERY	SPECIAL NOTE
Duchess of Devonshire	Reynolds	1723-1792	English	Devonshire House	An excellent example of the best school of English portrait-painting.
Feeding Her Birds	Millet	1814-1875	Barbizon	Lille Museum	Shows a peasant woman feeding her three children, who sit on the doorstep.
Feeding the Sheep	Jacque	1813-1894	Barbizon		Jacque was the great sheep painter of the Barbizon group.
**Fighting Temeraire*	Turner	1775-1831	English	National Gallery, London	A marvelous combination of landscape painting and sentiment.
**Flight into Egypt*	Rubens	1577-1640	Flemish	Cassel	A tiny canvas, but one of Rubens' chief masterpieces.
Frieze of the Prophets	Sargent	1856-	American	Boston Public Library	Great in conception and in execution.
Garden of the Hesperides	Leighton	1830-1896	English	Leeds Gallery	One of the artist's best works.
Gleaners, The	Millet	1814-1875	Barbizon	Louvre	Famous the world over for its faithfulness to nature.
Golden Stairs	Burne-Jones	1833-1898	English		A group of beautiful young women descending a circular stair.
Heads of Angels	Reynolds	1723-1792	English	National Gallery, London	These heads are really idealized portraits of children.
Holy Family	Murillo	1617-1682	Spanish	Louvre	Not so famous as the *Immaculate Conception*, but showing the same excellence.
Holy Night	Correggio	1494-1534	Parmese	Dresden Gallery	One of the "twelve great paintings."
Home of the Heron	Inness	1825-1894	American	Art Institute, Chicago	A study in the rich golden and orange tones that Inness loved so well.
Hope	Watts	1817-1904	English		A graceful female figure, blindfolded, seated upon a globe.
Horse Fair	Bonheur	1822-1899	French	Metropolitan Museum, New York	The most famous work of this great animal painter.
**Immaculate Conception*	Murillo	1617-1682	Spanish	Louvre	One of the "twelve great paintings."
Interior of a Cottage	Israels	1824-1911	Dutch	Walters Collection, Baltimore	In the so-called *genre* painting, few have surpassed Israels.
Isle of the Blessed	Böcklin	1827-1901	Swiss	National Gallery, Berlin	Shows the wonderful coloring so characteristic of this master.
Joan of Arc	Bastien-Lepage	1848-1884	French	Metropolitan Museum, New York	The maid is shown with an inspired look, listening to the voices.
John Alden and Priscilla	Boughton	1833-1905	American	Public Library, New York	Also called *Pilgrims Going to Church.*
John the Baptist	Andrea del Sarto	1487-1531	Florentine	Cloister of the Scalzi	Shows the Baptist when but a boy.
La Belle Jardinière	Raphael	1483-1520	Umbrian	Louvre	The name means *The Beautiful Gardener*, for the Madonna is shown in the midst of a garden.
Lake, The	Corot	1796-1875	Barbizon		One of the finest examples of Corot's art.
Last Judgment	Michelangelo	1475-1564	Florentine	Sistine Chapel	One of the "twelve great paintings."
Last Supper	Da Vinci	1452-1510	Florentine	Santa Maria delle Grazie, Milan	One of the "twelve great paintings."
Laughing Cavalier	Hals	1584-1666	Dutch	Wallace Collection, London	The laughter is so infectious that the observer laughs, too.

ONE HUNDRED FAMOUS PAINTINGS—*Continued*

TITLE	ARTIST	TIME	SCHOOL	GALLERY	SPECIAL NOTE
Leaving the Hills	Farquharson				A flock of sheep and their shepherd, coming down from the hills with the misty sunset light behind them.
Lesson in Anatomy	Rembrandt	1607-1669	Dutch	Royal Museum, Hague	The picture which marked the beginning of Rembrandt's fame.
Light of the World	Hunt	1827-1910	English	Keble College, Oxford	A figure of the Christ, bearing a lighted lantern and standing before a closed door.
The Look-Out	Homer	1836-1910	American	Boston Art Museum	A characteristic painting of this most characteristically American of all artists.
Love and Death	Watts	1817-1904	English	Tate Gallery, London	Death forcing his way into a doorway, pushing Love to one side.
Madame Le Brun and Her Daughter	Le Brun	1755-1842	French	Louvre	Widely known through its numerous reproductions.
Madame Recamier	David	1748-1825	French	Louvre	The original of the excellent portrait was a famous leader of society in the time of Napoleon.
Madonna of the Burgomaster Meyer	Holbein	1497-1543	German	Darmstadt Gallery	So called because Holbein introduced into his altarpiece portraits of the Burgomaster Meyer and his family.
Madonna of the Chair	Raphael	1483-1520	Umbrian	Pitti Gallery, Florence	Particularly notable because of the perfect way in which the figures are fitted to the circular space chosen.
Madonna of the Grand Duke	Raphael	1483-1520	Umbrian	Pitti Gallery, Florence	One of the most beautiful of the Madonnas of this master painter.
The Mill	Ruysdaal	1625-1682	Dutch		
Mona Lisa	Da Vinci	1452-1510	Florentine	Louvre	The famous smile of this portrait has been the subject of endless dispute.
Monarch of the Glen	Landseer	1802-1873	English		A picture of a great antlered stag, one of the best works of this famous animal painter.
Napoleon at Fontainebleau	Delaroche	1797-1856	French	Leipzig Museum	This picture, like most of the pictures painted by this famous French artist, shows great historical accuracy.
**Night Watch, The*	Rembrandt	1607-1669	Dutch	Rijks Museum, Amsterdam	Not in reality a night scene.
Oxen Going to Work	Troyon	1810-1865	Barbizon	Louvre	Troyon was one of the greatest of all animal painters.
Penn's Treaty with the Indians	West	1738-1820	American	Independence Hall, Philadelphia	Shows Penn and the Indians under the great Shackamaxon elm, since blown down.
Plowing in the Nivernais	Bonheur	1822-1899	French	Louvre	Considered by many critics her best picture.
Pot of Basil	Alexander	1856-1915	American	Boston Museum	A striking picture, which has for its theme Keats's poem of *Isabella, or the Pot of Basil.*
Queen Louise	Richter	1823-1884	German	Cologne Museum	This idealized portrait of the loved German queen has been very popular.
Quest of the Holy Grail	Abbey	1852-1911	American	Boston Public Library	A series of mural paintings, among the best in the country.
Rain, Steam and Speed	Turner	1775-1831	English	National Gallery, London	So suggestive is the painting that the observer can actually feel the rush through the rain.

TITLE	ARTIST	TIME	SCHOOL	GALLERY	SPECIAL NOTE
Reading from Homer	Alma-Tadema	1836-1912	Dutch		Reproduces with wonderful faithfulness the classic atmosphere.
Red Deer at Chillingham	Landseer	1802-1873	English		
Return of the Gleaners	Breton	1827-1906	French	Luxembourg	The most celebrated work of this painter of the fields.
Return of the Mayflower	Boughton	1834-1905	English		A picture that tells a story and calls up a genuine emotion.
Return from the Farm	Troyon	1810-1865	Barbizon	Louvre	
Sacred and Profane Love	Titian	1477-1576	Venetian	Borghese Gallery	The significance of this picture is not clear, but its beauty is undeniable.
Saint Anthony and the Christ Child	Murillo	1618-1682	Spanish	Berlin Museum	One of Murillo's masterpieces, ranking with the *Immaculate Conception.*
Saint Sebastian	Guido Reni	1575-1642	Bolognese	Louvre	A popular work, often reproduced.
Sheep: Spring	Mauve	1838-1888	Dutch	Metropolitan Museum, New York	The United States recognized the genius of Mauve before his own or any other European country appreciated him.
**Shepherd of the Pyrenees*	Bonheur	1822-1899	French		Reproduced with article BONHEUR, ROSA.
Sir Galahad	Watts	1817-1904	English	Tate Gallery, London	Watts' wife, Ellen Terry, was the original of this figure.
**Sistine Madonna*	Raphael	1483-1520	Umbrian	Dresden Gallery	One of the "twelve great paintings."
**Song of the Lark*	Breton	1827-1906	French	Art Institute, Chicago	Reproduced opposite page 916.
Sower, The	Millet	1814-1875	Barbizon	Vanderbilt Collection, New York	One of the finest of Millet's works.
Spirit of '76	Willard		American		Popular for historic interest rather than for artistic merit.
Spring	Botticelli	1447-1515	Florentine	Florence Academy	This canvas breathes the very spirit of spring.
Surrender of Breda	Velasquez	1599-1660	Spanish	Prado, Madrid	One of the world's great historical paintings, frequently called *The Lances,* because of the weapons borne by the soldiers.
Transfiguration	Raphael	1483-1520	Umbrian	Vatican	One of the "twelve great paintings."
Tribute Money	Titian	1477-1576	Venetian	Dresden Gallery	
Ulysses Deriding Polyphemus	Turner	1775-1831	English		An excellent example of this artist's marvelous landscape backgrounds and rich color effects.
Washington	Stuart	1755-1828	American	Metropolitan Museum, New York	This unfinished work is regarded as the best portrait of Washington.
Washington Crossing the Delaware	Leutze	1816-1868	German	Roberts Collection, New York	It is the subject, rather than the artistic quality, of this work which has made it famous.
Whistler's Mother	Whistler	1834-1903	American	Luxembourg Gallery, Paris	Charming in subject, in composition and in color.
Young Bull	Potter	1625-1654	Dutch	Royal Museum, Hague	Perhaps the most famous picture of cattle in the world. Does not rank quite so high as it did a century ago.

* Reproductions in color of the paintings here marked with an asterisk will be found in connection with the biographies of the artists in these volumes.

tury was not sanctioned in Spain, and the religious element predominated far more in Spanish art than in the contemporaneous art of any other country. After the death of Velasquez and Murillo, the art of their country suffered a decline, but in after years a few Spanish artists attained distinction, notably Morales, Roelas, Cano and Zurbaran.

The Netherlands. In the revolution that almost destroyed the Netherlands, Flemish art was lost for a time, and it was not until the seventeenth century that it was again raised to a high pinnacle of greatness by the masterly hand of Rubens. He was the prince of Flemish painters, a master of composition, and a colorist ranking next after the famous Venetians. His pupil, Van Dyck, was the fashionable portrait painter of Antwerp. After them came Jordaens, who delighted to paint large canvases; Franz Snyders and Fyt, the animal painters; and Teniers, the leading painter of scenes from common life. Then Flemish art steadily declined.

Dutch painting reached its height during the seventeenth century in Rembrandt, the greatest of all Dutch artists, known as the "King of Shadows" because of his skill in light and shade. He had the power to transform the commonest objects in everyday life into poetical images by the mystic light in which he placed them. Frans Hals, the jovial portrait painter, ranks next. About this time also a noted class of *genre* painters flourished, including Jan Steen, the "laughing philosopher of Dutch art;" Gerard Douw, famed for the beauty of his finished little pictures; and Maes, who excelled in homely interiors. Among the great landscape painters of Holland, Jacob Ruysdael stands first, while Hobbema, Cuyp, Vermeer and Wouvermans follow at close range. The leaders of marine paintings are Van de Velde and Backhuysen. Paul Potter is the great animal painter. Dutch art is among the most realistic in the world, and has had many imitators.

Modern Painting. This division includes the period extending from the beginning of the eighteenth century to the present time. One of the most notable features of the modern period is the transition from religious and aristocratic themes to those of common life. We might truly say that during the eighteenth century art turned from autocracy to democracy. The great painters lived with the common people, from whom they obtained much of their inspiration.

English art boasts of no early history. Not until the eighteenth century do we find the first English interpreter of English life—William Hogarth. English painting really began with him, and from that time on developed very rapidly. Hogarth was followed by the eminent portrait painter, Sir Joshua Reynolds, and by Gainsborough. But Gainsborough excelled also as a landscape painter, and is now hailed as the first real interpreter of English rural scenery and English common life. From these we pass to William Turner, "The Great Hermit of Nature," who was preëminent among the water color artists of his day and was one of the greatest landscape artists of all time. The English are proud of their nineteenth century painters, foremost among whom are Landseer, the animal story-teller of the Victorian Era; Sir Frederick Leighton, painter of classical subjects; Sir Lawrence Alma-Tadema, who also revived classic art and specialized in old marble halls and balconies; Dante Gabriel Rossetti, William Holman Hunt and Sir Everett Millais, of the Pre-Raphaelite Brotherhood; Sir Edward Burne-Jones, the painter of the Golden Age; and George Frederick Watts, the painter of portraits and ideal studies of moral and religious significance.

France. France did not take first rank until the nineteenth century. During the reign of Louis XV art and morals were at the lowest ebb. Painting was chiefly devoted to the decoration of the interiors of palaces for the king and members of his court, and it represented the voluptuous life of the time. With the beginning of the French Revolution, in the latter part of the eighteenth century, art became inspired by war and patriotism, with David as the great reformer. At first he turned his attention to classic subjects, but later devoted his efforts to the portraits of Revolutionary heroes. David and his followers adopted the classic style of painting and it influenced French art throughout the century. In the nineteenth century a new style of French art became prominent. Its themes were drawn from nature. Animals, landscapes and scenes of common life were portrayed with lasting effect. Rosa Bonheur shared with Landseer the honor of being one of the two greatest animal painters of the age. The Barbizon School of Painting (see BARBIZON PAINTERS) arose and attracted the best artists of France. Here Rousseau, Diaz, Troyon, Jacque, Corot and Millet either lived in the Barbizon region or came to it for fresh inspiration.

Other Nations. At the beginning of the nineteenth century Cornelius, with Overbeck, Veit and others, formed the association of Nazarene Painters, which had an important influence on German art. Cornelius also revived the long-neglected art of fresco painting. Kaulbach was his most noted pupil. Through the influence of Kaulbach and others the stiff forms of the Nazarene painters were forgotten in the brilliant paintings of the best representations of the modern school, among whom were Knaus, the Berlin genre painter; Max, the poet painter of Munich; Lenbach, who immortalized Bismarck in art; and Heinrich Hofmann, whose *Christ in the Temple* in the Dresden Gallery is one of the representative paintings of the modern school. Josef Israels brought again to Dutch painting the glory of the seventeenth-century period. In Spain, Sorolla painted wonderful landscape scenes, particularly pictures of the sea. The greatest representatives of Russian painting are Swedomsky, the historical painter; Vereshchagin, traveler and artist, whose war scenes are widely known in Europe and America, and Kramskoe, a painter of religious subjects.

Painting in the United States. Until the early part of the nineteenth century art in America followed that in England. The first American artist of repute was John Singleton Copley, whose portraits of leading characters in New England history previous to the Revolutionary War are highly prized. Benjamin West, who attained distinction in London, was born in Pennsylvania, and for a time had a studio in Philadelphia. Gilbert Stuart attained distinction as a portrait painter, and his *Washington,* although unfinished, is considered to be the best likeness of the "Father of his Country." Among American landscape artists who have attained distinction are George Inness, whose works were exhibited at the Paris Expositions of 1867 and 1900; Bierstadt, whose *Yosemite* and other scenes of the Rocky Mountains have given him more than a national reputation, and Moran, whose *Grand Canyon of the Yellowstone* was placed in the Capitol at Washington. Trumbull, the foremost historical painter, is noted for his scenes of the Revolutionary War, four of which adorn the Capitol at Washington. John La Farge was the greatest of American decorators. Winslow Homer is noted for his sea scenes and fishes; Whistler, for his mystic creations and his portraits, and Sargent, for his mural decoration and realistic portraits.

The first great step towards the development of an American school of art was the founding of the American Academy of Design in New York in 1825. The art exhibit at the Centennial Exposition of Philadelphia in 1876 strikingly revealed the inferiority of American painting. It became the custom for American artists to study abroad—in Paris, Munich and Rome. French, German and Italian methods were introduced by these artists into the United States, and the society of American Artists was founded in New York to perpetuate these ideals.

Several of the leading cities now have art schools of a high order of excellence. The collections in art museums and private galleries contain many works of rare merit, and the influence of these institutions, together with the instruction in art in the public schools, is gradually raising the public standard of art throughout the country.

Painting in Canada. Previous to the founding of the Royal Canadian Academy in 1880 the best painters of the Dominion went abroad to study and usually remained in France or England. Since the beginning of the present century there has been a strong movement exerted in favor of Canadian art, and its influence is gaining strength throughout the Dominion. In 1907 the Canadian Art Club, including among its membership several prominent artists, was founded to promote present advanced tendencies. Among the best known Canadian artists are Archibald Browne, Clarance Gagnon, William Hope and Homer Watson.

Twelve Great Paintings. The following are usually listed by art critics as the world's twelve greatest paintings:

Assumption of the Virgin, by Titian; *Aurora,* by Guido Reni; *Beatrice Cenci,* by Guido Reni; *Communion of Saint Jerome,* by Domenichino; *Descent from the Cross,* by Rubens; *Descent from the Cross,* by Volterra; *Holy Night,* by Correggio; *Immaculate Conception,* by Murillo; *Last Judgment,* by Michelangelo; *Last Supper,* by Da Vinci; *Sistine Madonna,* by Raphael; *Transfiguration,* by Raphael.

For descriptions of these paintings see elsewhere in this article *One Hundred Famous Paintings.*

Related Subjects. The following biographies of famous artists and articles on more general topics will supplement admirably this discussion of painting:

Abbey, Edwin Austin
Alexander, John W
Allston, Washington
Alma-Tadema, Lawrence
Angelico, Fra

Apelles
Bartolommeo, Fra
Bastien-Lepage, Jules
Bellini, Giovanni
Bell-Smith, Frederick M.
Bierstadt, Albert
Blashfield, Edwin H.
Bonheur, Rosa
Botticelli, Sandro
Boughton, George H.
Brangwyn, Frank
Breton, Jules A.
Brymner, William
Burne-Jones, Sir Edward
Caravaggio, Michelangelo M. da
Carracci
Challener, Frederick S.
Copley, John S.
Cornelius, Peter von
Corot, Jean B. C.
Correggio
Crane, Walter
David, Jacques Louis
Domenichino
Doré, Paul Gustave
Dürer, Albrecht
Eyck, Hubert Van and Jan Van
Gainsborough, Thomas
Gelée, Claude
Gerome, Jean Leon
Ghirlandajo
Giordano, Luca
Giorgione
Giotto
Guido of Arezzo
Guido Reni
Hals, Frans
Herrera, Francisco
Hobbema, Meindert
Hogarth, William
Holbein
Hunt, William Morris
Inness, George
Israels, Josef
Kaulbach, Wilhelm von
La Farge, John
Landseer, Sir Edwin H.
Leighton, Frederick, Lord
Leutze, Emanuel
Lippi, Filippo
Meissonier, Jean L. E.
Memling, Hans
Michelangelo
Millais, Sir John Everett
Millet, Jean François
Munkacsy, Mihaly
Murillo, Bartolomé Esteban
Parrhasius
Parrish, Maxfield
Peale, Charles Wilson
Peale, Rembrandt
Perugino, Pietro Vannucci
Poussin, Nicolas
Raphael Santi
Rembrandt
Remington, Frederic
Reynolds, Sir Joshua
Rossetti, Gabriel Charles Dante
Rubens, Peter Paul
Ruysdaal, Jacob Van
Sargent, John Singer
Sarto, Andrea del
Schnorr von Karolsfeld, Julius
Steen, Jan
Stuart, Gilbert
Teniers, David
Tintoretto
Tissot, James Joseph Jacques
Titian
Turner, Joseph M. W.
Van Dyck, Anthony
Velasquez, Don Diego
Vereshchagin, Vasili
Veronese, Paul
Vinci, Leonardo da
Watteau, Jean Antoine
Watts, George Frederick
West, Benjamin
Whistler, James A. McN.
Wilkie, Sir David
Zeuxis
Zorn, Anders

GENERAL ARTICLES

Angelus, The
Annunciation, The
Assumption in Art, subhead under Assumption, Feast of the
Barbizon Painters
Cartoon
Chiaroscuro
China Painting
Corcoran Art Gallery
Cubist School of Painting
Foreshortening
Fresco
Holy Family
Impressionist School of Painting
Lake
Madonna and Her Babe
Nimbus
Ocher
Paint
Perspective
Ultramarine
Water Colors

PAISLEY, *payz'li,* a town of Southern Scotland, situated in Renfrewshire on White Cart Water, seven miles southwest of Glasgow. Paisley is one of the world's chief centers for the manufacture of cotton thread, and is the headquarters of the widely-known Coats and Clark thread factories. The manufacture of the famous Paisley shawl, once a rival of the Cashmere in the markets of the world, was a flourishing industry in the nineteenth century, but is now practically extinct. There are at the present time factories for the manufacture of tartan cloths, handkerchiefs, carpets, soap, starch, corn flour and other products, and the town has dyeing plants, bleacheries, potteries and shipbuilding yards. Paisley is a modern, progressive community, with fine public buildings, many parks and recreation grounds, a famous race course, museums, public baths and libraries. The public utilities are owned and managed by the municipality. One of the chief points of interest is a restored portion of an abbey founded in the twelfth century. Population in 1921, 84,837.

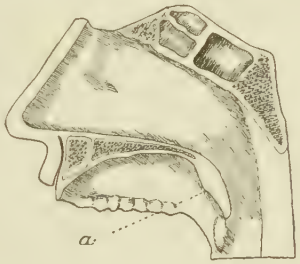
PAKENHAM, *pak'en am,* Sir Edward Michael (1778-1815), a British general killed in a battle which ought not to have been fought. He was born in Ireland, entered the army and was rapidly promoted, becoming major-general in 1812. While serving under Wellington in Spain during the Peninsular War he distinguished himself, especially at Salamanca, where he commanded the division which pierced the center of the enemy's line and insured the success of British arms. Having been sent to America in the War of 1812, he took part in the attack on New Orleans, and was killed on January 8, 1815, two weeks after the treaty of peace was signed in Paris. Andrew Jackson opposed Pakenham in this battle.

PALAIS, *pah la',* ROYAL *(royal palace),* a group of buildings in Paris, on the Rue Richelieu, of which an old royal palace forms the nucleus. This was built in 1619-1636 by Richelieu, and at his death was bequeathed to Louis XIII, after whose time it was occupied by the Orleans family. Philippe Egalité, of that family, made public gardens of part of the grounds, and allowed shops and bazaars to be set up in the court. During the later years of the French Revolution it was held by the republic, but after the downfall of Napoleon it came into the possession of Louis Philippe, who lived there until he became king. In the days of the second empire Prince Napoleon, cousin of Napoleon III, occupied it, but he was driven out in 1871, and a part of the building was burned, but it has since been restored. Cafés, bazaars, charming gardens and the Theâtre du

Palais Royal make the Palais Royal a very popular public resort.

PALANQUIN, *pal an keen',* the name of a vehicle, formerly much used in India, but more recently a favorite means of transportation in China and Japan. The word is derived from the Sanskrit *palyanka,* meaning *bed.* It is simply a covered litter on which the passenger reclines. It is a box-shaped conveyance, about eight feet long by four feet in width and height; the sides and ends are usually protected by blinds or shutters which can be let down so as to leave windows; the door is in the side. It is suspended on poles, passing through rings near the top and projecting about four feet from each end, and is carried by four men, who rest the poles on their shoulders, which are protected by pads. Many palanquins are richly made and approach luxuriousness in their appointments. The carriers move forward in a slow trot. An inexpensive form with canvas sides is used by poorer people.

PAL'ATE, the roof of the mouth. The palate consists of two parts, the *hard palate,* in front, and the *soft palate,* behind. The hard palate is formed by projections of the upper maxillary bones and the palate bones, which are covered with a thick layer of periosteum. A ridge extends from front to back on the median line. The hard palate is covered with a mucous membrane which is lined with a thin membrane, the epithelium. In these membranes are numerous minute sacs which form the palate glands.



THE PALATE
(*a*) is the location of the soft palate.

The soft palate consists of a fold of muscular tissue covered with mucous membrane. It forms a partial partition between the mouth and the pharynx and is raised in the act of swallowing to close the entrance to the back nasal passages. A conical projection called the *uvula* hangs from the middle of the soft palate, and on each side of the uvula are two curved folds of membrane called the arches of the soft palate. The soft palate contains numerous glands that secrete mucus which lubricates the throat. See MOUTH; TONSILS.

PALATINATE, *pa lat'i nate,* the name of two German states, distinguished as the Upper, or Bavarian, Palatinate and the Lower, or Rhenish, Palatinate. The former was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower Palatinate, or the Electoral Palatinate proper, covered an area of 3,150 square miles and lay on both sides of the Rhine; its capital was Heidelberg. The Counts Palatine were in possession of the Palatinate and the districts belonging to it as early as the eleventh century, and they were among the most powerful princes of Germany. By the Peace of Westphalia in 1648 the Lower Palatinate was separated from the Upper. To Bavaria was given the latter, while the former became a separate electorate and thenceforth was generally known as the Palatinate. By the treaties of Paris, 1814 and 1815, the Palatinate was split up, Bavaria receiving the largest part, the remainder being divided between Hesse-Darmstadt, Baden and Prussia. The name now belongs to the detached portion of Bavaria west of the Rhine, while the Upper Palatinate forms another portion of Bavaria. See GERMANY, subtitle *History of Germany.*

PALEONTOLOGY, *pa le on tol' o ji,* the science of *ancient beings,* particularly the classified study of fossils. Each system of rocks contains fossils of the plants and animals that lived when the rocks were formed. By the study of these fossils geologists can tell what sorts of plants and animals lived during each period in the earth's formation. Those who devote their entire time to this study are known as *paleontologists.* They are able to classify the plants and animals of the past ages nearly as well as botanists and zoölogists classify those of the present time. This classification is a great aid in separating geologic time into eras and periods as they are now recognized. See FOSSIL; GEOLOGY.

PALEOZOIC, ERA, *pal e o zo'ik,* that great division of geologic time extending from the Proterozoic to the Mesozoic Era. It includes the Cambrian, Ordovician, Silurian, Devonian, Carboniferous and Permian periods, each of which is described under its title. The era was very long, as is known from the number of periods it included and also by the great thickness of the rock systems that were formed. During the era life developed from the simplest forms of plants and animals to complex forms resembling those of the present day. See GEOLOGY.

PALERMO, *pa lur'mo,* a seaport, formerly the capital of Sicily, picturesquely situated in the northwestern part of the island, on the Bay

of Palermo and at the mouth of the fertile valley called the "Golden Shell." To the north rises Mount Pellegrino, with a grotto chapel to Saint Rosalia, a favorite place of pilgrimage; the festival in honor of this saint is one of the great annual events. Palermo has much of interest and charm in its busy harbor and its curious street scenes and types. The oldest public buildings date from the Norman period, the most noteworthy being the cathedral of Saint Rosalia, begun in 1169. There are almost three hundred churches and chapels. The University enrols 1,400 students. The city also has a national museum, an art gallery, several large libraries, a royal palace, the archiepiscopal palace, a customhouse and many theaters. It is the residence of the military commandant of the island and has an arsenal and shipbuilding yards. Industry is little developed, but the fisheries are extensive and give employment to thousands of people. The chief exports include oranges, lemons, dried fruits, sumach, oils, wine and lemon juice.

Palermo was probably founded by the Phoenicians, and was the stronghold of Carthage in Sicily. It was conquered, in turn, by the Romans, the Saracens and the Normans. The German emperors and the French subsequently held it. In 1820 and 1848 the city revolted against the Bourbon kings of Naples and in 1860 was freed from them by Garibaldi. Population in 1915, 345,891.

PALESTINE, *pal'es tin.* When one thinks of Palestine, or the Holy Land, as it is commonly called, it is nearly always in connection with the life of Jesus, who spent his earthly years entirely within its borders. That wonderful life is the crowning glory and chief distinction of this small country. It has few natural advantages for civilization, but has been the melting pot of the deepest religious convictions of mankind. Many travelers describe the Holy Land, but the accounts differ, for men see it from many varying angles. All see the barrenness, the unfulfilled possibility of greatness; some see racial poverty and wretchedness, boldly and harshly outlined; others are softened by the thought of the greatness just missed by one of the nations of antiquity, the Hebrews.

In Old Testament times the country was known as *Canaan* and *Philistia,* and was inhabited by Canaanites and Philistines, Palestine being the Philistine name of the southern part of Canaan. The modern Palestine lies along the eastern Mediterranean coast from the Mountains of Lebanon in the north, and extends east and south to the somewhat indefinite western boundaries of the Arabian Desert. The area is about 10,000 square miles, or about that of the state of New Hampshire.

Centuries ago this whole section was covered by the waters of the Mediterranean. In the course of time a portion of the land, about thirty-five miles wide in the north and 100 miles wide in the south, was raised above sea level. On the opposite side, in the east, the land tipped down toward the west, and in the lowest part was the Jordan River, fed by the springs in the Lebanon Mountains, and emptying into the Dead Sea, at the south. This explains why this sea and the Sea of Galilee, which is also in the course of the Jordan, are below sea level. The Dead Sea has no outlet and is very salt. The Sea of Galilee, on the contrary, is fresh and contains many fish. These two seas and the Jordan River are the only important bodies of water in Palestine. The surface of the country is broken by large outcroppings of pinkish sandstone.

West of the Jordan and extending north and south runs a long chain of rugged hills, wooded in places by oak, cedar, ash, sycamore and oleander trees. There are many valleys, and in the north, just below the Mountains of Lebanon, which rise to a height of 9,000 feet in Mount Hermon, lies the plain of Esdraelon. From the summit of Mount Hermon, snow-covered in winter, may be seen the whole of this small country. In the south the mountains called Judean Hills slope gently westward toward the sea. In this section, which is the most fertile part of Palestine, grains and grapes, figs, olives and apricots are raised in abundance. The descent on the eastern slopes of the hills is very rapid, and much of this rough country is, and has always been, a wilderness. The only harbor on the coast is that of Jaffa, and even there boats cannot land except in favorable weather. A railroad now runs from Jaffa southeast to Jerusalem.

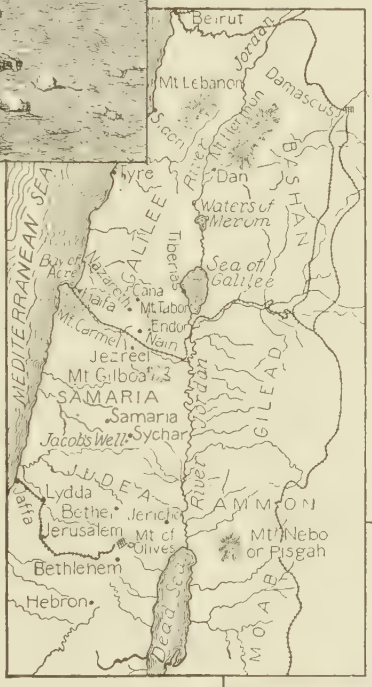
The inhabitants of Palestine, who number about 700,000, are a very mixed people. The greater number, since the Moslem conquest in the seventh century A.D., have been Arabic; there are a few Hebrews and a small number of Europeans. The most primitive conditions and customs prevail. In very few places are the roads good, and traveling is by foot, on the backs of the donkey or camel, or possibly by rude carriages. The primitive wells and the springs throughout the country are all

associated with Bible characters. The well of Bethlehem and Jacob's well are both familiarly known. Shepherds still tend flocks of sheep on the Judean hills.

There are two seasons in Palestine, summer and winter. The winter season, which is moderately cold and rainy, lasts from November until April. The summer is dry and, especially in the inland villages east of the coast plains, very hot. The wild flowers of Palestine are many. The country marks the southern limit of the milder temperatures and the northern limit of tropical climates, and its flowers are typical of both. Among about 1,000 varieties, flowering almonds, azaleas, acacias, the scarlet anemone, the narcissus and the crocus are abundant.

Palestine, for long years the home of the Hebrew race, was under control of Rome in the time of Christ. In the seventh century it passed under the Moslem power, and from 1516 to 1919 was in the hands of the Turks and a part of the Turkish Empire. The dream of the Jews, that Palestine might be restored to a semblance of Israel's former days, seemed to promise realization when in 1919 the peace conference erected it into an independent state.

M.W.

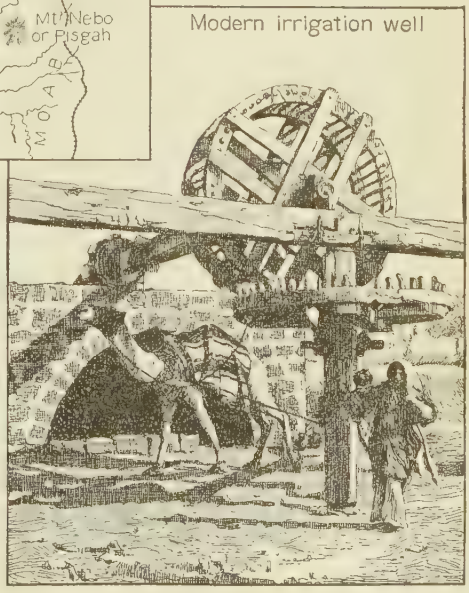


Related Subjects. The following articles in these volumes are suggested as supplementary reading in connection with Palestine:

Beersheba	Jerusalem
Bethel	Jesus Christ
Bethlehem	Jews
Canaanites	Jordan
Crusades	Judea
Dead Sea	Lebanon, Mountains of
Galilee	Nazareth
Gethsemane	Nebo, Mount
Hebron	Olives, Mount of
Jaffa	Samaria
Jericho	

PALESTINE, Tex., the county seat of Anderson County, situated in the eastern part of the state about midway between the northern and southern borders. Houston is 160 miles south; Austin, 180 miles southwest. Railway transportation is provided by the International & Great Northern road. The first settlement was made in 1846, and the place was incorporated in 1870. Since 1910 it has been governed on the commission plan. The population increased from 10,482 in 1910 to 11,039 (Federal census) in 1920. The area exceeds three square miles.

Palestine is located in a highly-productive cotton region, where large deposits


Modern irrigation well

of iron ore and salt are also found. The trade is chiefly in fruit, vegetables, live stock, cotton, grain and manufactured products. The general offices and big shops of the International & Great Northern Railway are located here. Besides these establishments there are foundries, an ice plant, bottling works, lumber mills and cotton and cottonseed-oil mills. Palestine has two city parks, a $75,000 Federal building, a $200,000 courthouse, a fine high school building, a well-equipped $125,000 hotel, a convent school and a Carnegie Library. J.G.

PALESTRINA, *pah lays tre' nah,* Giovanni Pierluigi da (1524-1594), an Italian composer, born at Palestrina, near Rome. When he was a very young boy he was heard singing by a chapel master of Rome, who offered him free lessons in music. After several years' study in Rome Palestrina returned to his native town to play the cathedral organ and to teach singing. The bishop of this place later became Pope Julius III and almost immediately sent for his friend, the humble Palestrina, to become music director of the Chapel of Saint Peter in the Vatican. Soon the musician was appointed by the Pope to a position as singer in the Papal Chapel, the first married man ever granted this honor.

When Pope Julius died and Pope Paul IV came to the Vatican, Palestrina went to other Roman churches as organist, and at length became director for the Church of Santa Maria Maggiore, the one in front of which he had been heard singing as a boy. In 1563 Pope Pius IV declared that church music must be improved, and Palestrina wrote a model mass so beautiful and dignified that practically all masses of the Roman Catholic Church have been patterned after it. Pope Pius gave him the title of "Composer to the Pontifical Chapel" and restored him to his former position as director of music in the Chapel of Saint Peter. In 1575 a great celebration in his honor was held at Rome, and thousands of Italians came to the city to march in the procession and sing his songs. In the midst of his composing he died at Rome, in 1594. Among his most celebrated works are his *Masses,* especially the *Messa Brevis,* and *The Song of Solomon.*

PALIMPSEST, *pal' imp sest,* an ancient manuscript which had been scraped and written upon again. The word means *scratched,* or *scraped again.* With the waxen tablets used in Rome, this was a natural method of procedure, but other materials did not lend themselves so readily to the treatment. There were several reasons why palimpsests from papyrus were not very common (see Papyrus). First, the material was very plentiful; second, it was almost always used on one side only, so that the other side was available for later writings; and third, it was not strong enough to bear much erasure. Parchment was not so plentiful, and when scribes or the medieval monks wished material whereon to inscribe their copies of great works, they resorted to the method of re-using manuscripts. Some kinds of ink were washed off with special preparations; some had to be scraped off. In many instances the obliteration was not complete, and the earlier writings may still be read; even in cases where there is little sign of the original, chemicals may often be applied which bring back the color to the old inks. Naturally where the manuscripts were thoroughly scraped, there is no means of recovering the originals.

From the seventh to the ninth century destruction of old writings was very common, and many valuable works were doubtless lost by this means. As often as possible, however, incomplete or damaged manuscripts were used for palimpsests; among all the first readings which have been recovered, there has never been one complete work. But there have been parts found of very important works which were extant in no other form.

PALISADES, *pal i sayds',* a stretch of picturesque bluffs rising abruptly from the Hudson River to an elevation of from 200 to 500 feet and extending along the western bank of the river, not far north of New York City, from Haverstraw, N. Y., south to Weehawken, N. J., a distance of about thirty miles. This line of massive cliffs is the most prominent feature of the scenic beauty of the Hudson River district. About 18,000 acres in the vicinity have been set aside as the Palisades Interstate Park, located partly in New Jersey and partly in New York, and extending north of Bear Mountain. The park, which will ultimately cost about $6,000,000, is under the control of the Palisades Park Commission. Included in the area set aside is a tract of 10,000 acres in Orange and Rockland counties (New York), the gift of Mrs. Mary D. Harriman, widow of Edward H. Harriman, who also donated $1,000,000 for the project. Generous camping and picnic privileges are permitted by the park commissioners, and the grounds are visited and enjoyed by thousands of people from neighboring cities and towns. See full-page illustration, article New York (state).

PALISSY, *pa le se',* BERNARD (1510-1590), a great French potter, whose perseverance in the face of poverty and almost insurmountable obstacles serves as an inspiration to all who would succeed despite the discouraging elements besetting every worth-while career. A chance sight of an enameled cup made Palissy resolve to discover how to make enamels. For sixteen years he devoted himself to experiments which exhausted his resources. For want of money to buy fuel, he was forced to burn the tables and the flooring of his home. Still he kept on with his work, ignoring the mockery of his family and friends. He achieved success and fortune in 1557, when his enameled pottery and sculptures in clay became recognized as works of art. He soon located in Paris, where he devoted himself to his art as well as to the field of science; his scientific lectures aroused an interest only secondary to his art. He suffered persecution as a Huguenot, was arrested in 1589 and thrown into the Bastille, where he died.

PALLADIUM, *pa la' di um,* a silver-white metal discovered by an English chemist, William H. Wollaston, in 1803. It was named for the planetoid Pallas, identified the previous year. Palladium occurs chiefly in platinum ores, but is also found in combination with gold and silver. It can be drawn into a wire or be hammered into sheets (see DUCTILITY; MALLEABILITY), melts at a temperature of about 2,815° F., and has a specific gravity of about 12. Its symbol is Pd, and its atomic weight 106.7 (see CHEMISTRY). Palladium bears a general resemblance to platinum, but is harder and lighter. Because of its capacity for absorbing hydrogen it is used in chemical analysis; because of its hardness, lightness and resistance to tarnish it is employed in the construction of scientific instruments. Palladium alloys are valued in making hair springs for watches because their elasticity does not vary with the temperature. The total production of palladium in the United States in 1914 was 2,635 Troy ounces; in that year the average price of the refined metal was $44 per ounce, as compared with $45 for platinum.

PALLADIUM, a famous statue of Minerva, made of olive wood, said in the Greek myths to have fallen from heaven and to have given safety to the city of Troy, where it was held. During the Trojan War Ulysses and Diomedes undertook to carry away the image. They went secretly at night, and Ulysses, who lifted up his companion so that he could climb over the walls, was unable to get in himself, as Diomedes refused to assist him. When they were returning in safety, Diomedes carrying the image, Ulysses tried to slay his companion and take the palladium. A glint of moonlight on his sword betrayed his purpose, and Diomedes compelled the disappointed Ulysses to march in front all the way back, hurried by slaps from the sword of his companion.

Different stories are told of the fate of the image. The Greeks are said to have obtained an imitation only, while the real statue was taken to Rome by Aeneas, where it was preserved in the temple of Vesta. Another legend placed the true image in the Parthenon at Athens. See TROY.

PALLAS ATHENE, *pal' as a the' ne,* a name given by the Greeks to the goddess whom the Romans called Minerva (which see).

PALM. "Useful as well as ornamental," is a phrase to which the tree family of *palms* has a stronger claim than any other plant group. Palms come second to the grasses in economic importance, but enjoy the distinction of being applied to a far greater variety of everyday human needs. It is estimated, for instance, that the *palmyra palm* has 800 different uses. The palm is to the native of tropical lands, where it grows abundantly, what the seal is to the Eskimo of North America—the source of the prime necessities of life.

A Numerous and Ancient Family. Geologists have found palm fossils which prove that the family was once a great deal larger and more cosmopolitan than it is to-day (see FOSSIL). In the infancy of the earth, palms grew luxuriantly as far north as Upper Canada and Greenland; now they are confined chiefly to tropical regions, although some varieties grow in more northern climates. Though it is on the decline, the family is still large, numbering about 1,100 different species. They are divided into two great classes; one is the *fan palm,* with leaves looking like huge palm-leaf fans split into slender strips often forty feet in length, the other, the *feather palm,* with leaves resembling uncurled ostrich plumes, sometimes as long as twenty feet. Among the fan palms the most familiar are the *cabbage palmetto* of South Carolina, the *Washington palm* of the California deserts and the *palmyra palm* of India and Ceylon. The *cocoanut palm* and *date palm* are the commonest types of the feathery-leafed class. The name *palm* itself comes from the fact that the leaf of the fan palm looks like the outspread hand.

Habits of Growth. Most of the members of the palm family are towering giants, some of them reaching heights of eighty to 100 feet, with straight, branchless trunks surmounted by magnificent tufts or rosettes of waving leaves,

a-Date Palm
b-Cabbage Palmetto

Of threads of palm was the carpet spun
Whereon he kneels when the day is done,
And the foreheads of Islam are bowed as one!

To him the palm is a gift divine,
Wherein all uses of man combine—
House and raiment and food and wine!

And, in the hour of his great release,
His need of the palm shall only cease
With the shroud wherein he lieth in peace.

"Allah il Allah!" he sings his psalm,
On the Indian Sea, by the isles of balm;
"Thanks to Allah, who gives the palm!"
—WHITTIER: *The Palm-Tree.*

and sheathed in shaggy masses, composed of the dead leaves of other years. The *doom palm*, cherished by the Arabs, is almost the only variety possessing a branched stem. There are *dwarf* palms, growing very low; palms that creep like vines; and still others, like the *rattans* (or ratans), that have stems hundreds of feet long and leaves with hooked ends, by means of which the plants climb from tree to tree.

The small greenish or yellowish blossoms that hang in great clusters on the palm tree are enclosed in sheaths which in some species literally explode into bloom. In many varieties the male and female—or staminate and pistillate—flowers grow on different trees, and natives, following the custom handed down from father to son, though without knowing the scientific reason, fertilize the blossoms of one tree by placing among them the blossoms of another.

A Servant of Man. There is a poem of Whittier's called *The Palm-Tree* which tells some of the many hundreds of ways in which the palm makes itself useful to mankind. He describes a ship on the Indian Sea—a ship made of palm wood, with its sails and ropes woven from palm fiber, its master eating and drinking the products of the tree, his dress and turban fashioned from the fiber of its leaves, and the very prayer carpet on which he kneels spun from "threads of palm." A part of the poem is given under the illustration accompanying this article.

From the trunk of the date and palmyra palms, especially, comes timber for houses, furniture, fences, ships, spars and wharves. The palmetto is particularly useful for wharf piles, since its corky wood is not easily rotted by water or destroyed by barnacles. The stems of the rattan furnish the flexible material from which wicker furniture and men's walking sticks are made.

From the pithy trunk of the *sago palm* and *cabbage palmetto* is secured the starchy meal called sago. The bud that grows at the top of the cabbage palmetto is sometimes cut out by natives, even though to do so means destroying the tree; boiled, this bud tastes much like cabbage. The sap of different species yields palm sugar, or *jaggery*, palm honey, palm wine, vinegar, or the spirit called *arrack*. The spines, which in some branches of the family grow from the leaf scars on the trunk, serve as needles for the women and as arrowheads and fishhooks for the men. In other varieties the scars exude a valuable resin or, as in the case of the *wax palm* of Peru, a vegetable wax, which is used in making candles.

The great leaves of the palmyra and most other palms are used for thatching native dwellings and for walls, screens and bedding. In South America a mother will put her baby to sleep in a cradle made from a gigantic palm

leaf, turning up its edges and hanging it among the branches, that baby may enjoy the lullabies of the wind and the birds. Matting, shields, hats, clothing, fans, baskets, and rope and twine are all made from the fibrous leafstalks. The fiber of the *piassaba palm* is found in many of the brooms and brushes in common use, from the finest to the coarsest.

Among the edible fruits, the date and the cocoanut are most widely used, the latter giving also its sweet milk, which in some places is prepared as a delicious wine. From the fruit or seed of the cocoanut, the *bacaba,* the *oil palm* and scores of other varieties is secured an oil that is put to many uses—as a butter, a lubricator, an illuminator and a source of soap and candle grease. In Africa the seed of the date palm is roasted and used as coffee. The nut of the *ivory palm* yields a vegetable ivory which is employed as a substitute for elephant ivory. The seed of the *betel-nut palm,* mixed with lime, is spread on a leaf of the betel vine to make the narcotic that is so much chewed in India, destroying teeth and initiative at the same time.

Familiar examples of the use of the palm as an ornament are the imposing avenues of tropical cities, lined with majestic *royal palms* or with the *Mexican palmetto* that flourishes as far north as many Texas cities. The smaller palm of the conservatory, which is so popular for decorating spacious interiors, is cultivated for the market principally in the states of the South and the Middle West. L.M.B.

Related Subjects. The reader is referred to the following articles in these volumes:

Betel	Ivory Palm
Cocoanut	Palmetto

PALMA, *pahl'mah,* the chief town of the Spanish province of Baleares and the capital of the island of Majorca, is situated on the Gulf of Palma, 130 miles east of Barcelona, Spain. The city is the port of the whole island and carries on an extensive trade; it is built in amphitheater form and is walled in and fortified; its port is protected by a breakwater. The principal manufactures include flour, soap, leather, glass, paper, woolen goods and foodstuffs. Its shipbuilding yards are of considerable importance. The principal buildings are the cathedral, the exchange, the governor's palace and the town hall. Palma has a number of fine schools, two public libraries and a museum of painting. Population, 1920, 68,000.

PALMA, Tomas Estrada (about 1836-1908), first president of the republic of Cuba. He was born at Bayamo, Cuba, educated in Spain, and in 1868, when the first war for independence broke out, joined the revolutionary army, in which he rose to the rank of general. On the establishment of a provisional republic he was made president, but was captured by the Spaniards and kept a prisoner until 1878, when Spanish rule in the island was once more firmly established.

He was not allowed to return to Cuba, and for years taught a school at Central Valley, N. Y., but never relinquished his dream of Cuban independence. When the insurrection of 1895 broke out he became one of its leaders. After independence was achieved, with the assistance of the United States, he was elected president in 1902 and four years later was reëlected, but the Liberal opposition stirred up a revolutionary movement which forced him to resign. Palma was a genuine patriot who placed the interests of his country far above his own, but he was somewhat deficient in energy and decision.

See Cuba, subhead *History,* relating to the time; also, Spanish-American War.

PALM BEACH, Fla., a well-known winter resort, situated in Palm Beach County, on the southeast coast of Florida, and on the west coast of an arm of land separated from the mainland by Lake Worth. Transportation is provided by the Florida East Coast Railroad. The Royal Poinciana, one of the largest resort hotels in the United States, the Breakers and other hotels, parks and beaches are the features of the place. A local estimate gives 1,000 as the resident, and 5,000 as the winter, population.

West Palm Beach, the county seat of Palm Beach County, is on the west shore of Lake Worth, opposite Palm Beach. It was incorporated as a city in 1886, and the Federal census of 1920 gives the permanent population as 8,659. It also is a popular resort, and offers excellent boating and fishing during the season. The city has a county courthouse which cost $165,000, and a county high school, constructed at a cost of $65,000. It is served by the Florida East Coast Railroad and by a line (under construction in 1916) to Lake Okechobee through the Upper Everglades, a fertile agricultural section. L.G.B.

PALMER, *pahm'er,* Alice Freeman (1855-1902), an American educator, college president and the first dean of women in the University of Chicago. She was born at Colesville, N. Y., was graduated in 1876 at the University of

Michigan, and taught successively at Lake Geneva, Wis., Ottawa, Ill., and East Saginaw, Mich., before her appointment in 1879 to the chair of history at Wellesley College. Two years later she was made acting president of the institution, and in 1882 was formally elected to the Wellesley presidency. In 1887 she was married to George Herbert Palmer, professor of philosophy at Harvard University, and resigned her position, though she did not give up her active interest in educational work. When the University of Chicago was organized in 1892 she was made nonresident dean of women. The chimes in Mandel Tower at that institution were installed in her honor by her husband.

PALMERSTON, *pahm'er stun,* Henry John Temple, Viscount (1784-1865), an English statesman, one of the most prominent figures in the history of his country in the middle nineteenth century. He was born in Hampshire, educated at Harrow and at the University of Edinburgh, and entered Parliament in 1807. Two years later he became secretary of war, and this office he held until 1828, through six administrations. In 1830 he accepted the post of secretary of state for foreign affairs in Earl Grey's cabinet, and this he filled, except for a brief interval, for eleven years. Intensely interested as he was in making England respected abroad, he found plenty to occupy his attention both in Western Europe and in the Far East, and established himself in the judgment of continental statesmen as the foremost man of England. His aggressive policy in the East resulted in the Opium War.

From 1841 to 1846 Palmerston was out of office, but with the return of the Whigs to power he again became foreign secretary. His openly expressed approval of Louis Napoleon's act in declaring himself emperor of France led to his dismissal from the cabinet in 1851, but in the new ministry formed the next year he became home secretary. Three years later, when the Earl of Aberdeen's administration proved unable to cope with the Crimean War, Palmerston was made Premier and brought the war to a successful conclusion. A vote of censure for his action in regard to the difficulties in China led to his resignation in 1857, and although an appeal to the people returned him to power, he was again defeated in 1858. In the next year he again became Prime Minister, and continued in the office until his death.

During the American War of Secession he favored a policy of neutrality, though his sympathies were rather with the South.

Throughout his long period in office Palmerston was extremely popular. This was due in part to his personal charm, but largely to the fact that he upheld England and English dignity in the eyes of the world.

PALMETTO, *pal met' o,* the name applied to several kinds of fan-leaved palm trees, the best known being the cabbage palm. South Carolina has a picture of this tree on its coat of arms, and is sometimes called the *Palmetto State* (see South Carolina). Among other species are the *dwarf, blue,* and *saw* palmettos, which are found in low regions along the United States coast, particularly in the southeastern part of the country, and in the West Indies. Some of these trees grow to a height of fifty feet, but the *dwarf,* as its name suggests, is low and stemless. Piers and wharves are made from the durable wood of the cabbage palm, and its fibrous leaves are made into hats, baskets and fans. See Palm; Cabbage Palm.

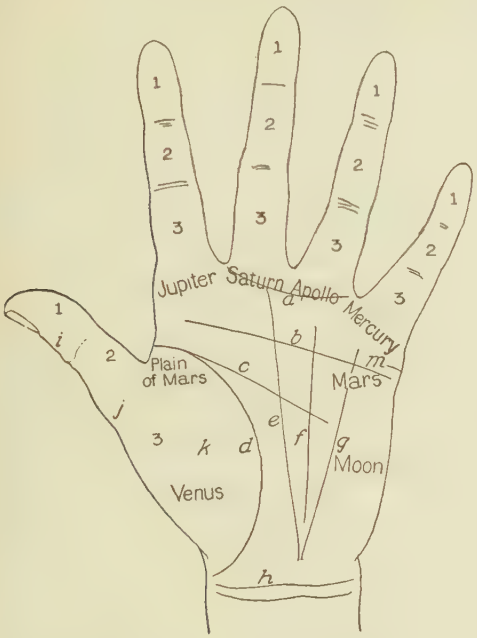
PALMISTRY, *pahm' is tri,* the alleged art of reading character and personal fortune from the relations of the lines and creases and form of the palm. The history of the notion is uncertain; it was developed in connection with the ambitious and uncritical pursuits of the Middle Ages, which attained their most elaborate development toward the end of the sixteenth century. Its motive is akin to the reading of signs of personal fortune which runs through ancient practices; it forms a conspicuous example of the pseudo-sciences.

At the end of the eighteenth century a palmist foretold the downfall of Napoleon, and the ancient practice took a renewed hold on the credulous, because of the greatness of the French emperor, the havoc wrought by his wars and the ultimate fulfilment of the prophecy. Believers in palmistry did not admit that the palmist might have been merely a shrewd guesser; he had foretold a momentous event, and the credit was given to this so-called science. To-day belief in it is on the decrease, but considerable interest yet centers around the practice. The theory on which it is developed may be briefly stated:

In palmistry the *mounts* of the hand and the *lines* in the palm are made to tell the story of individual destiny. The mounts are the elevations at the base of the fingers and thumb and in the palm from the little finger to the wrist. They are named for the planets, and are seven in number (see diagram). When well developed, the mounts indicate the possession of the quality associated with the respective planets.

For example, a strong mount of Jupiter denotes pride and ambition; Apollo, art, riches; Saturn, fatality; Mercury, science, wit; Venus, love, music; Mars, cruelty, courage.

The principal lines are shown in the illustration. The line of life surrounds the thumb; if long, it indicates long life, but if not continuous, that is, if broken, from whatever cause,



THE HAND IN PALMISTRY

(*a*) Ring of Venus	(*g*) Line of health
(*b*) Line of heart	(*h*) Bracelets
(*c*) Line of head	(*i*) Will
(*d*) Line of life	(*j*) Reason
(*e*) Line of fate	(*k*) Love
(*f*) Line of fortune	(*m*) Line of marriage

The numbers 1, 2, 3 refer to the mounts of the joints in fingers and thumbs.

the possessor will not live to old age. The line of heart, if long, distinct and well colored, indicates an affectionate disposition; the nearer the line stretches towards Jupiter the more favorable the opinion as to devotion of character and warmth of affection. A strongly-marked line of head is alleged to indicate superior intellectual qualities, also imagination, provided the line stretches to the mount of the moon. If the line of head is winding it is supposed to show indecision of character and a tendency to frivolity.

Enough has been outlined above to make clear the general basis on which palmistry builds its supposed science. Its arguments are ingeniously framed, but there is offered no satisfying theory as to the correctness of its assumptions. E.D.F.

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Relating to Various Beliefs. The articles on the following topics, while not bearing on palmistry, are of interest in this connection:

Alchemy	Occult
Astrology	Phrenology
Clairvoyance	Physiognomy
Conjuring	Psychical Research
Demonology	Psycho-Analysis
Divination	Spiritualism
Faith Cure	Subconscious
Hypnotism	Suggestion
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft

PALM OIL, a thick, yellowish oil obtained from the fruit pulp of the oil palm of West Africa. It is of a butterlike consistency when cool, is dark orange in color, and has so pleasant an odor that the natives of the Gold Coast use it for butter, although it is liquid in that climate. It is largely imported for the manufacture of soap and candles and for lubricating purposes, and is also used to flavor toilet preparations. The oil is extracted by boiling the fleshy covering of the palm fruits, which grow in dense clusters. A pale yellow or whitish oil, of agreeable odor and the flavor of nuts, is extracted from the crushed kernels of the fruit. This oil is used in the manufacture of vegetable butter and of soaps.

PALM SUNDAY, the last Sunday of Lent and the Sunday preceding Easter, the first day of Holy Week. It was first celebrated in the fourth century by the Christian Church in Jerusalem in commemoration of the triumphal entry of Jesus, when He rode into the city seated on an ass and the multitude strewed branches in His way (*John* XII, 12-15). It was a festival of joy, a procession starting at the Mount of Olives and passing from one to another of the churches, the bishop taking the part of Jesus and riding on an ass, and the children singing and waving palms. The later observance of Palm Sunday in the Roman Catholic Church took the form of a solemn processional and a mass of mourning. Some time in the Middle Ages was added the ceremony of the consecration of palms by the priest, to be taken home as tokens of good by the people.

PALMYRA, *pal mi'ra,* a celebrated city of antiquity, situated in an oasis in the Syrian Desert, about 150 miles northeast of Damascus. Its site is now occupied by a few Arab huts, but there still remain ruins of ancient structures that tell a story of former magnificence. Among these ruins are the remains of a splendid temple to the Sun and those of a colon-

nade of marble columns that extended over nearly a mile. According to tradition, Palmyra (the Tadmor of the Bible) was founded or enlarged by Solomon. In the third century A. D., when the famous Zenobia was its queen, the city was stormed and destroyed by the army of the Roman Emperor Aurelian. It was afterwards rebuilt, and as late as the fourteenth century was a prosperous trading center, but after the close of the Middle Ages it declined into a group of hovels. See ZENOBIA.

PALMYRA PALM, a species of palm occurring throughout India and nearby islands and in other tropical regions. It is one of the most useful plants known. The wood is employed for building houses in the countries where it grows, the leaves are utilized for thatch, baskets, mats, hats, fans and umbrellas, the fiber for twine and rope, and the fruit, seeds and stalks (of the young plant) are eaten. In the northern part of Ceylon the palmyra palm is almost the sole source of livelihood for thousands of the natives. The plant grows from twenty to seventy feet in height, bearing fan-shaped leaves four feet long, and a large, triangular shaped fruit. See PALM.

PALO ALTO, *pah'loh ahl'toh,* BATTLE OF, an engagement of the Mexican War, fought on the plain of Palo Alto, eight miles northeast of Brownsville, Tex., May 8, 1846. It was the first serious battle of the war, and was brought about by the attempt of General Arista, with over 6,000 Mexicans, to cut off General Taylor and 2,000 men from Point Isabel, the base of American supplies. After fighting all day against three times their number, the Americans won. Arista retreated to Resaca de la Palma, where he was defeated a second time a few days later. According to official estimates, the American loss at Palo Alto was seven killed and forty-seven wounded; the Mexicans lost over 250.

PALO ALTO, CAL., a small city two miles from the southwestern end of San Francisco Bay, which has become widely known as the seat of Leland Stanford University. It is situated in Santa Clara County, on San Francisquito Creek and on the Southern Pacific Railway; the Peninsula Interurban Electric Line connects with towns southeast. San José, the county seat, is eighteen miles southeast, and San Francisco is thirty miles northwest. Population, 1910, 4,486; in 1920, 5,900.

The city has Saint Patrick's Seminary, which prepares young men for the priesthood and is the leading institution of its kind on the Pacific coast. Sacred Heart Academy, for girls, Manzanita Hall, for boys, Castilleja School and Miss Harker's School are other prominent educational institutions. The Carnegie Library contains 10,000 volumes. The first house was built here in 1891, when the university was founded by Senator Leland Stanford and his wife. They named the place Palo Alto (Spanish for *tall tree*) for the redwood tree, 162 feet high and twenty-eight feet in circumference, which stands on the estate. In 1894 the city was incorporated, and a freeholders' charter was granted by the state legislature in 1909. See LELAND STANFORD JUNIOR UNIVERSITY. E.S.L.

PALPITA'TION OF THE HEART, a very rapid beating of the heart, producing, in varying degrees, the sensation of suffocation, shortness of breath or other distressing feelings. It may be a symptom of organic heart disease or of goiter, and is often brought on by anaemia (which see). A very common cause is flatulence, that is, over-distension of the stomach, as a result of indigestion. In this case the upward pressure on the diaphragm causes the irregularity of the heart's action. Shock, excitement and excessive use of stimulants may bring on attacks. Persons who suffer from palpitation through wrong habits of eating and indulgence in stimulants should correct their habits. Frequent and persistent attacks, indicating the presence of a more serious condition, call for treatment by a reliable physician. For other suggestions, see HEART, subheads *Care of the Heart* and *Diseases of the Heart.*

PAMIR, *pah meer',* the highest plateau in the world, situated in Central Asia, in the region where the Himalaya, Hindu Kush, Kuenlun and Tian Shan mountain systems converge. The name Pamir comes from two Persian words meaning *foot of the mountain peaks.* The Persians also call it *the roof of the world,* because of its elevation, and tradition says that it is the original home of the Aryan, or white, race. The greater part of the plateau is barren and mountainous, but in the valleys, along the few lakes and the River Oxus, which has its source here, the native Kirghiz find pasture for their cattle. During the summer, Pamir is very hot, and from November to April it is impossible to traverse it because of cold and snow; nevertheless two important trade routes across it have been used for ages. The plateau has an estimated area of 36,000 square miles and a mean elevation of from 13,000 to 15,000 feet above sea level.

PAMLICO, *pam'li ko,* **SOUND,** the largest sea lagoon on the Atlantic coast of the United States, an indentation of North Carolina. At its northeastern extremity it is connected with Albemarle Sound by a small outlet, Croatan

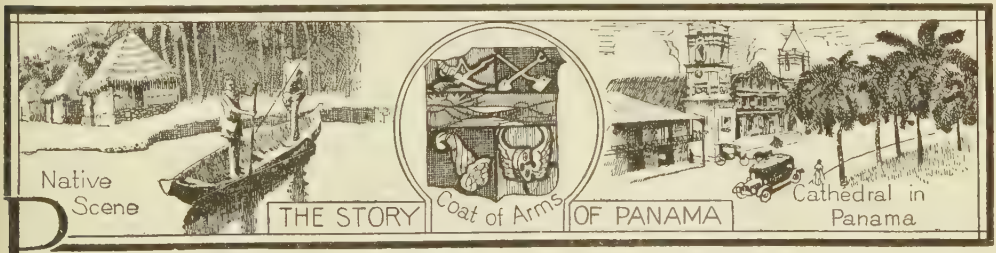
LOCATION MAP

The low, swampy section of North Carolina. The land between the sound and the ocean is a narrow ribbon of sand.

Sound, and at the southwestern end it has communication with the ocean by Core Sound. These outlets are about sixty miles apart. The greatest width of Pamlico Sound is about twenty-four miles. A long, narrow beach, cut by three navigable inlets, separates the sound from the Atlantic on the east. On this beach is Cape Hatteras, the farthest point extending into the ocean. The Neuse and the Pamlico rivers flow into the sound through estuaries. It has valuable oyster beds and is visited by numerous wild fowl.

PAM'PAS, a Spanish word meaning *plain,* is used to designate several great plains of South America, but is most commonly applied to the immense grass-covered plain in the central part of Argentina, between the Rio Salado on the north and the Rio Negro on the south, which merges into the steppes of Patagonia. During the wet season a luxuriant growth of vegetation provides pasturage for large herds of cattle and sheep, and a portion of the region along the Parana is suited to farming. The population of about 26,000 is composed chiefly of gauchos, who are Spanish and Indian half-breeds. See ARGENTINA.

PAN, in classical mythology, the greatest of the woodland deities, the god of shepherds, hunters and fishermen. He was supposed to be the son of Mercury, and at his birth was so frightful looking that his nurse fled in terror. Mercury, however, was much amused at the red face, the horned head and the goat's body and limbs; and wrapping the child in a rabbit skin, he carried him up to Olympus. All the gods were much delighted with his curious appearance, and christened him *Pan,* or *all.* Pan was first worshiped in his own country, Arcadia, but later he was accepted as a deity by the Athenians and his worship spread widely. He was usually attended by the fauns and satyrs.



PANAMA, *pan a mah',* the youngest republic on the western continents, occupying practically all of the narrow Isthmus of Panama, which joins the two Americas. This small country, owing to its location, has played an interesting part in the world's history for many centuries. Its northern, or Caribbean, coast was sighted and explored by Columbus in 1502, on his fourth and last voyage to the New World, and eleven years later from one of its mountains Balboa first viewed the Pacific Ocean. At the time of the conquest and exploitation of Peru, the Spaniards found the isthmus a convenient pathway for the conveyance of their treasures of silver and gold, and Panama, on the southern coast, and Puerto Bello, on the northern, developed into noteworthy cities a hundred years before the Pil-

grim Fathers landed on Plymouth Rock. The wealth of Peru was first shipped to Panama, then carried overland to Puerto Bello, and from there transported to Spain across the Atlantic. The construction of a canal across the isthmus, a familiar matter of recent history, was considered by the Spaniards hundreds of years ago, and the story of the various attempts to build such a waterway, culminating in the successful effort on the part of the United States, is an interesting narrative.

Size and Location. The country of Panama is long and narrow, and runs approximately east and west. The northern coast is washed by the Caribbean Sea, an arm of the Atlantic, and the southern by the Pacific Ocean. On the east lies the republic of Colombia, and on the west the Central American state of Costa Rica. According to official figures, Panama covers an area of 32,380 square miles, a little less than that of Maine, but the land boundaries are not yet definitely established, and this estimate is only approximately correct. The length is about 425 miles, and the breadth varies from thirty-one miles to 118 miles, the average breadth being seventy miles. The coast line on the Caribbean Sea is 478 miles; that on the Pacific, 767 miles. The latter is deeply indented by the Gulf of Panama. A strip of land five miles wide on each side of the Panama Canal is included in the Canal Zone (see PANAMA CANAL).

LOCATION MAP

Since the political separation of Panama from Colombia there has been considerable discussion of the question of Panama's geographical status. As a part of Colombia it was also a part of the South American continent. As an independent country, whose interests are with the United States largely, many geographers now declare it to be a North American division.

Population. The inhabitants of the republic, without counting the people in the Canal Zone, numbered 401,428 in 1920. The population is made up of whites, who are mostly of Spanish descent; of Indians, who are natives of this region; of blacks, descendants of the slaves brought from Africa; and of mestizos, a dark-skinned people of mixed Spanish, Indian and negro descent. The latter form more than half of the population. There are, besides, hundreds of Europeans and people from the United States; the latter are increasing in number.

Cities. The two principal cities and seaports, and the terminals of the Canal, are Panama, the capital, on the Pacific side, with 61,369 inhabitants in 1917, and Colon, on the Atlantic, with a population of 26,076. Neither of these cities is included in the government of the Canal Zone. On the Pacific coast are the smaller ports of Agua Dulce, Pedregal, Montijo and Puerto Mudis; on the Atlantic are Bocas del Toro and Puerto Bello.

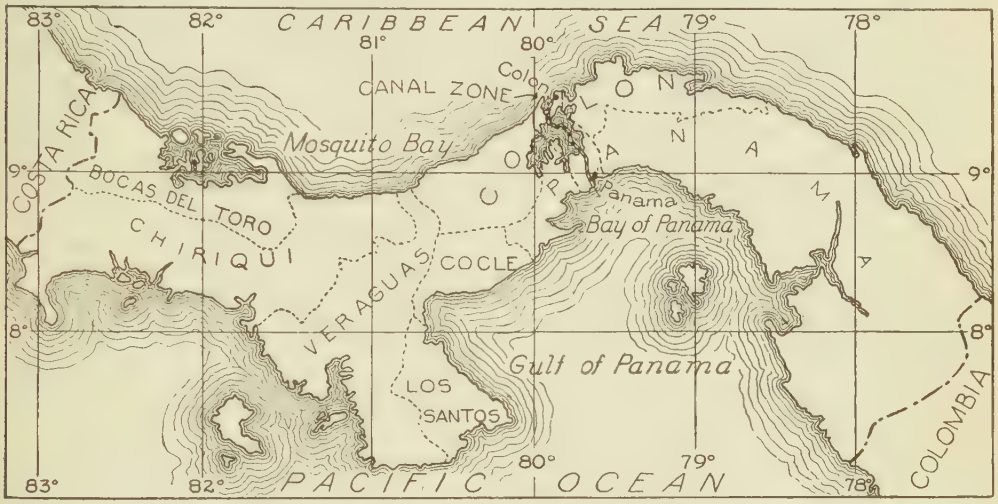
Physical Features. The greater part of the country is occupied by forest-covered hills and low mountains, separated by deeply-cut drainage valleys. In the western section, near the Costa Rica boundary, several lofty extinct volcanoes, some over 11,000 feet in altitude, give the scenery an element of grandeur. In this section the mountains are arranged in regular systems, but as a whole the hills and mountains of Panama are of irregular distribution. There are three passes through the highlands, affording communication between the two seacoasts—San Blas, Caledonia and Culebra. Through the last-named, which is the lowest, the Panama Canal was cut.

Over 300 of the streams of the isthmus flow into the Pacific, and about 150 into the Atlantic. The country between the Colombia boundary and the Gulf of Panama is drained chiefly by the Tuiara, which flows into the Pacific; west of this section is a region drained by the Bayano, or Chepo, and its tributaries; still farther west is the great drainage basin of the Chagres, the waters of which are utilized to supply the locks of the canal. The country westward to the Costa Rican boundary is watered by several minor river systems. There are no natural lakes.

Climate. Panama has a tropical climate, for the Canal Zone is only nine degrees north of the equator. The mean annual temperature is over 80° F., which is about twenty-five degrees higher than the mean annual temperature of the chief cities in the Southern United States. The year has only two seasons, a rainy season and a dry season. The former lasts eight months, from April to December, but even during the dry season showers are frequent; in fact, Panama is one of the wettest regions in the New World. In Colon there are usually 196 rainy days during the year, and the average yearly rainfall is 140 inches. In Panama

City the rainfall averages sixty inches a year. In addition to a tropical climate, there are several jungle swamps which are breeding places of mosquitoes, the carriers of malaria and yellow fever. Only those sections which have used modern sanitation to fight unhealthful conditions are free from tropical diseases. The entire Canal Zone is free from these dangers.

Natural Resources. Though the soil is rich and the rainfall is abundant, only a small portion of the isthmus is under cultivation. Five-eighths of the country is not even inhabited. Bananas are grown in large quantities by the United Fruit Company, which has plantations



THE REPUBLIC OF PANAMA

When a province of Colombia it was considered a part of South America. As an independent state it prefers to be classed with North American countries.

in the province of Bocas del Toro covering about 35,000 acres. Cocoanuts, coffee, tobacco, ivory nuts, sweet potatoes, cacao, cereals and sugar cane are other cultivated products. In the forests are found palms and rubber trees; hard woods like the mahogany, cedar and rosewood; sarsaparilla, copaiba and other medicinal plants, and various dyewoods. There are valuable pearl fisheries along the coasts of the Pearl Islands, in the Gulf of Panama. The isthmus contains deposits of gold, copper, iron and salt, but the mines are as yet in an undeveloped state.

Government. Panama is governed under a constitution adopted on February 13, 1904, and modeled after that of the United States. The President is chosen by popular vote for four years, and is not eligible for reëlection. He must be over thirty-five years of age. The legislative power is vested in the National Assembly, a single chamber whose members, called deputies, are chosen by the people for four years. A Cabinet of five members assists the President. Panama is divided into eight provinces, the governors of which are appointed by the President. At the head of the judicial system is a Supreme Court, with five judges appointed by the President. The Canal Zone is under the jurisdiction of the United States in matters of sanitation and police regulations.

History. Spanish rule over the isthmus ended in 1819, when Panama became part of the old republic of Colombia, and later of that of New Granada. In 1846 a treaty was concluded between New Granada and the United States, by which the latter obtained the right to guard the trade route and preserve the neutrality of the isthmus. In 1885 Panama, which up to that time had enjoyed a considerable degree of local self-government, was incorporated as a province of Colombia. This change was not satisfactory to the inhabitants, and the misrule of Colombia provoked not less than fifty-three revolutions in a period of fifty-two years, between 1850 and 1902.

In 1903 the United States attempted to make a treaty with Colombia whereby the former should have the privilege of the construction of the Panama Canal. In August of that year the Senate of Colombia rejected the treaty. The representatives from Panama withdrew, refusing to maintain any longer political relations with the government of Colombia, for they felt that the future interests of Panama

were imperiled. In November, 1903, Panama declared itself an independent republic. The United States immediately recognized the new government and concluded with it a treaty for the construction of the Canal. For this concession the United States made to the republic of Panama an immediate payment of $10,000,000, and bound itself to a perpetual yearly payment of $250,000, beginning with the year 1913. Since that time the country has been peaceful and prosperous. The government maintains over 360 public schools, and pays for the education of a number of students in Europe and the United States. O.B.

Related Subjects. The following articles in these volumes may be consulted in connection with this topic:

Balboa, Vasco Nunez de
Banana
Central America
Colombia
Colon
Panama
Panama, Isthmus of
Panama Canal

PANAMA, the first city founded by Europeans on the American continent, now the capital and largest city of the republic of Panama. It is at the Pacific end of the Panama Canal, and is the chief port of the country. Strange as it seems, Panama, on the Pacific Ocean, is many miles east of Colon, at the Atlantic end of the Panama Canal. This is due to the form of the isthmus at the point where the Canal joins the seas. The city lies entirely east of the state of Florida, and it is 200 miles farther east than Havana, Cuba.

The city was founded in 1519 by a Spaniard, Pedro Arias de Avila. In the centuries since that time it has had many changes of fortune, and has been in turn rich, powerful, poor and insignificant. During the sixteenth century the city, with a single exception, was the strongest Spanish fortress in America. Here came the great galleons, loaded with gold and silver from Peru. The *Camino Real,* the Royal Road, beginning in front of the Royal Treasury, crossed the isthmus through tropical forests to the Atlantic, and over this path the precious metals were then carried, to be placed again on vessels which sailed the Atlantic. Panama was rich, but in 1671 it was burned, and its treasures were carried away by the buccaneer, Henry Morgan.

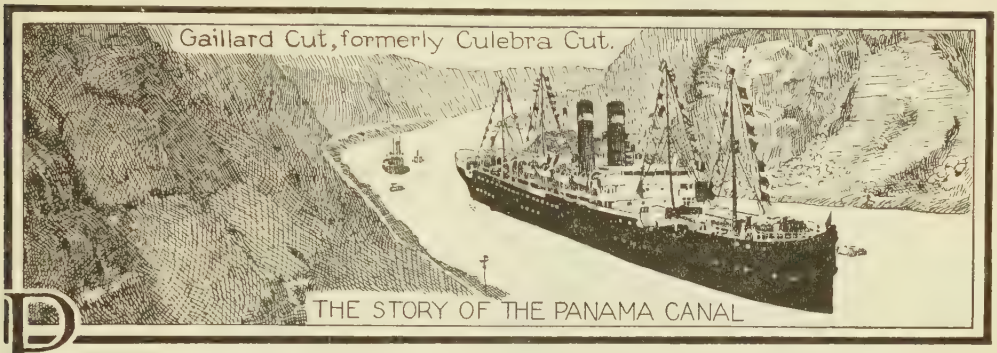
Two years after this disaster the city was rebuilt on its present site, which is five miles west of the original location, and it soon flourished again. Until the end of the eighteenth century it remained the chief Pacific port for all Spanish trade. For half a century its importance grew steadily less, until the discovery of gold in California again led hundreds of gold hunters across the isthmus in preference to the dangerous and wearisome journey by wagon over the Western prairies of the United States. In 1855 a railroad, built and operated by New York capitalists, was opened from Panama to Colon, then known as Aspinwall. Since that time Panama has been an important center for reshipping cargoes of all kinds.

Panama of the twentieth century owes its importance not to a railroad but to the great Panama Canal. Until the building of that waterway the city was not a healthful place in which to live. The streets were unpaved, and the frequent rains made them at times impassable. There was no provision for clean drinking water, or for proper disposal of sewage. The mosquito which carries yellow fever was everywhere, and a visit to Panama was certain exposure to disease. When the United States took over the construction of the Canal, the first thing to be done was to make the city a safe and sanitary place in which white men could live and work. With the permission of the republic of Panama, streets were drained and paved, a sewerage system was constructed, and most important of all, yellow fever and malaria were practically exterminated. This great task was carried to completion by Surgeon-General Gorgas of the United States army (see GORGAS, WILLIAM CRAWFORD).

The importance of Panama is due to the trade which passes through it. The harbor is shallow, but the American-built docks at Balboa, three miles away, furnish excellent facilities for shipping. All of the important buildings, except the cathedral, are modern, and the government palace, the national theater and the municipal building have been completed since 1903, when Panama declared its independence. The dwelling houses are mostly small and are built of stone and native woods, with the wide verandas which are characteristic of tropical countries. The streets, compared to Canadian or American streets, are narrow, but are clean and well paved. All sanitary arrangements are under the control of the United States, but with this exception it is governed as part of the republic of Panama. Population in 1911, 37,505; in 1917, 61,369. M.W.

PANAMA, ISTHMUS OF, the strip of land that connects North and South America and separates the Atlantic and the Pacific oceans. In a more limited sense the term has been applied to the narrow section between the cities of Colon and Panama, through which the great

Canal was dug; a similar section farther east has been called the Isthmus of Darien. The general tendency at the present time, however, is to consider the entire neck of land practically coextensive with the republic of Panama, as the Isthmus of Panama. For size and topographical features see PANAMA. The story of the excavation of the canal which gave the isthmus its importance, is related under the heading PANAMA CANAL.



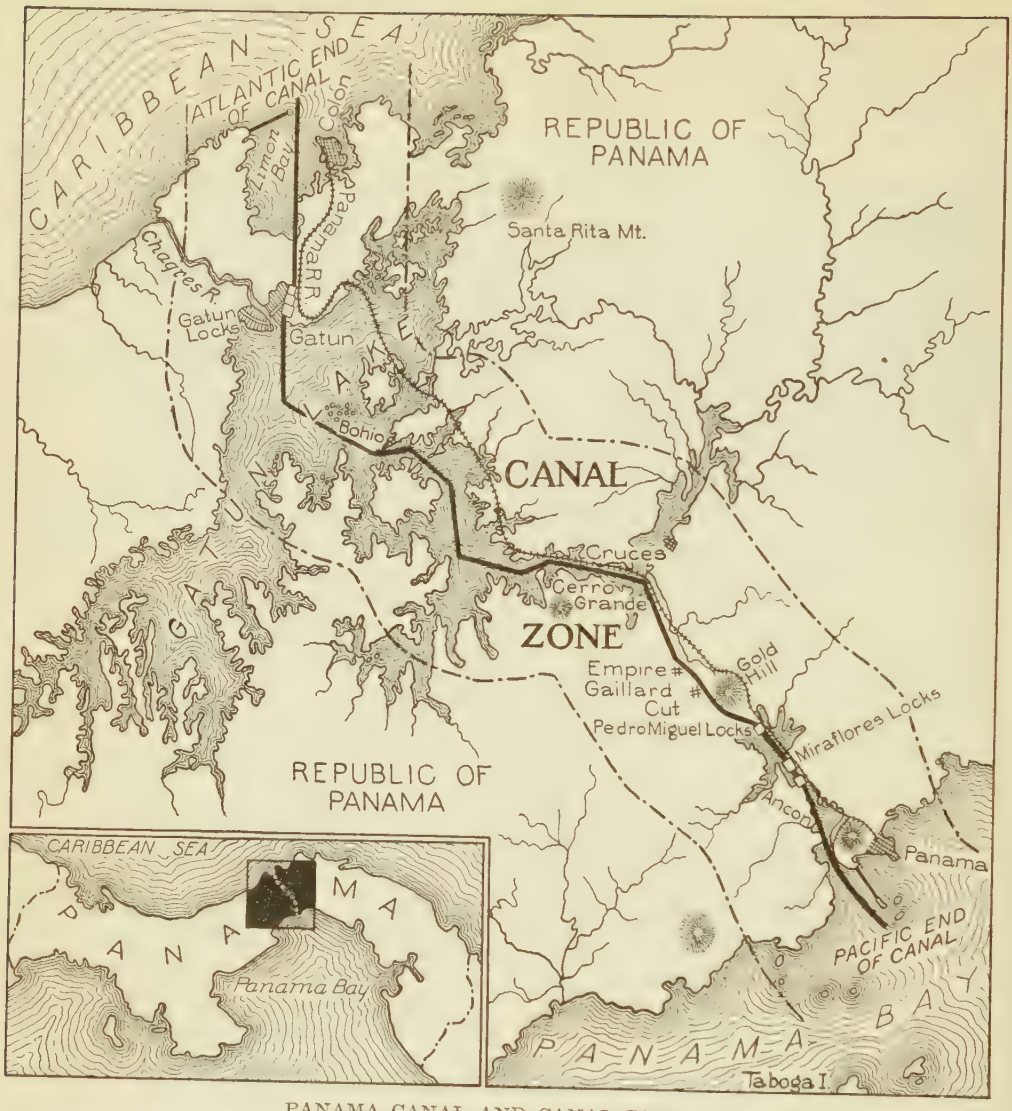
PANAMA CANAL. Ever since the day that marked the triumph of the adventuring Spaniard,

> . . . when with eagle eyes
> He stared at the Pacific—and all his men
> Look'd at each other with a wild surmise—
> Silent, upon a peak in Darien,

men have dreamed of a great waterway across the narrow band between the two Americas. Now, 400 years later, their dreams have come true. There is a canal, and one far greater than entered into the thoughts of most of those who advocated such a watercourse. The ships that pass through it carry cargoes richer than the gold-laden caravels for which King Ferdinand or King Philip would have liked to build it, and its existence will have consequences more far-reaching than any observer of to-day can estimate.

Whom the Canal Benefits. When the question of charging American vessels less for using the canal than other ships should be assessed was being discussed, in 1912 and 1913, some people said that unless the United States gave its own shippers some advantage it would have spent its four hundred million dollars only to benefit foreign nations. That this is far from being the case will be apparent from a study of the colored map accompanying this article. No other country, unless it be Canada, can hope to gain as great an advantage from the new route as the United States. Were there land in the middle of the Pacific, European nations would profit more than they do; as it is, Europe's route to China, Japan and Australia through the Suez is still its shortest path to the Orient, while New York, New Orleans and Galveston are now nearer to Yokohama and Melbourne than are Liverpool and Hamburg. San Francisco, too, formerly three times as far as London from the West Indian islands, is now closer to most of them, while New York, previously the same distance from Peru, Ecuador and Northern Chile as Genoa or French and English channel ports, is now but half as far. Distances between ports, reckoned in days, before and after the completion of the Canal, are graphically shown in the maps.

It seems strange to think of the Panama Canal as an internal waterway of the United States, and yet from this point of view it may prove even more valuable to the nation than as a highway for foreign trade. The very first year that the Canal was open canned fruits from California were carried through it on their way to Saint Paul by way of New York, and machinery from Saint Louis passed through New York on its way to the Pacific coast states. The reason for this was economy. Steamboats can always carry goods much farther for the same charge than can freight trains, for steamboats have no expense for building and keeping in repair grades and tracks, tunnels and bridges. The railroads may temporarily meet the competition of the Canal by reducing rates, but in many instances they cannot do this; and when Galveston, Mobile, New Orleans, Pensacola and Tampa, Baltimore, Charleston, Norfolk and Philadelphia have regular lines of steamers through Panama, and when improvements on the Mississippi and its tributaries are completed, this roundabout traffic will become still more common, and the benefits of the Canal to the United States will increase.



PANAMA CANAL AND CANAL ZONE

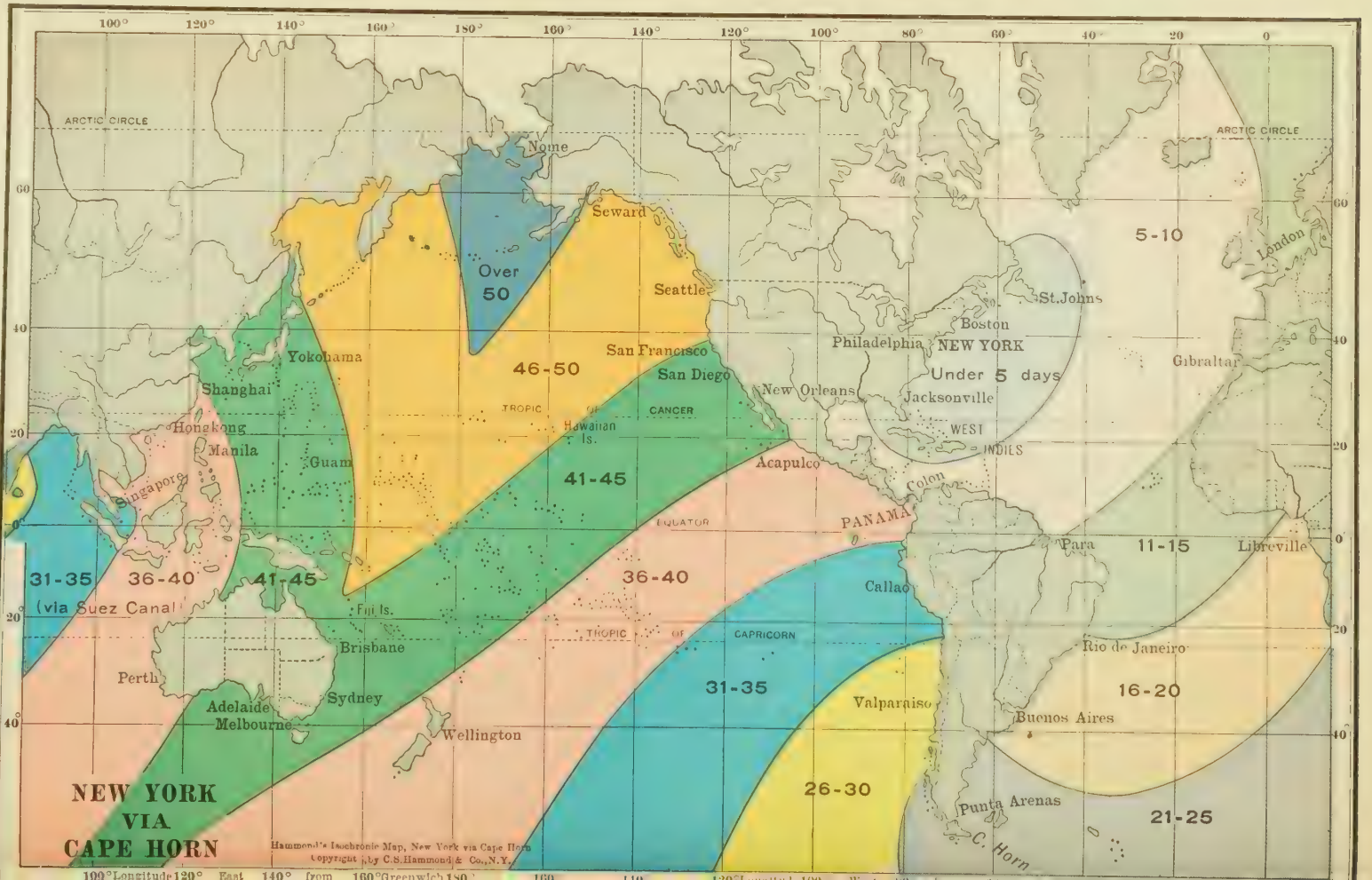
The small corner map shows the entire country of Panama; the solid black square represents that portion of the republic which appears in the larger map.

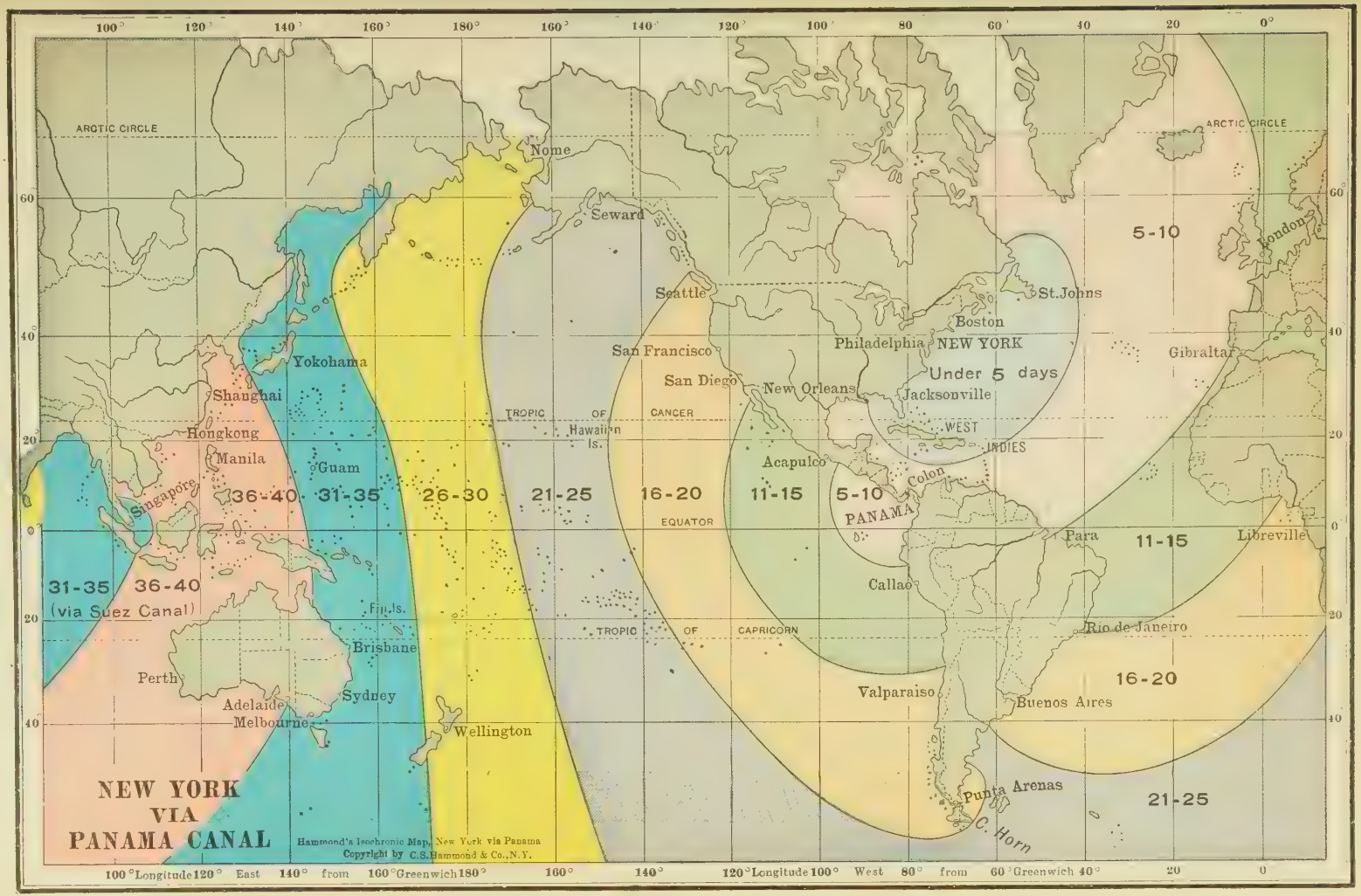
These changes do not mean that money will be taken from the treasuries of the railroads and put into the purses of the steamship companies. Just as economies in factory operation mean greater profits, so savings in internal transportation result in increased prosperity for a nation. If, for instance, California canners can buy their machinery cheaper than before, because of lower freight charges, they can sell their fruits at a lower price; since they can also ship them East with less expense, they can sell more of their products, employ more men or pay better wages, and grow more fruit.

Canada and the Canal. Most of the distances that are shortened for ports in the United States are shortened equally for Canada, and as the Dominion is rapidly increasing in importance as an exporting country, the Canal will eventually be of great advantage to it. The West is reaping the first benefits. There are two, and soon will be three, routes by which grain destined for England may be shipped eastward through Canada from the prairies. The water route through the Great Lakes is several cents a bushel cheaper than is transportation by rail, but it is closed by ice soon after

ISOCHRONIC CHARTS

The zones of color show the number of days taken to reach certain regions from the Port of New York before and after the completion of the Panama Canal. For comparative purposes the basis of three hundred nautical miles steaming per day has been adopted, each zone of color representing five days or 1500 miles.





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the harvest, and the same is true of the new Hudson Bay route. The way through Vancouver or Prince Rupert and the Panama Canal is less expensive than the Great Lakes trip, and is available all the twelve months. Some grain is already being carried this way, and as shipping and elevator service on the Pacific coast improve, the volume of such shipments will increase. Other commodities which pass eastward through the Canal are British Columbia timber and salmon.

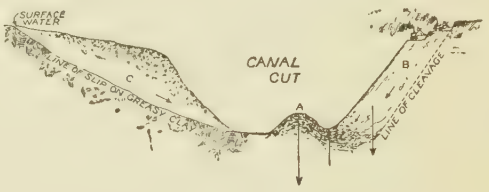
A Trip Through the Canal. A strange fact about this Canal joining the eastern and western oceans is that when you pass through it from the Atlantic to the Pacific you finish your journey twenty-five miles east of your starting point. The Isthmus of Panama is thirty miles wide, and the canal extends south and then southeast, a total distance of 43.84 miles. At the Atlantic, or Caribbean end, is the city of Colon (the Spanish word for Columbus), and at the other extreme lies Panama City, the capital of the republic.

A ship from New York bound for Pacific ports passes between the breakwaters, then steams south seven miles to the first lock, advancing most of its way through the channel which has been dredged in the shallow waters of Limon Bay. Next, four, or perhaps six, powerful electric locomotives, running on tracks at the side of the Canal, are attached to the boat, and pull it quietly into the lock; as soon as the gates are closed the ship begins to rise two or three feet a minute. When the third lock has been passed the vessel steams out into Gatun Lake, eighty-five feet above the level of the Caribbean. Each of the locks can accommodate a ship 1,000 feet long and 110 feet wide, and there is no boat in the world so large. The locks are built in pairs, so while westbound ships are climbing up the water stairway eastbound ships may be descending it.

For the next thirty-two miles the boat advances under its own power, winding south and east between the hills that edge the valley of the Chagres River, then plunging into the backbone of the isthmus through the famous Culebra Cut, eight miles long. Before the Americans reached Panama the Chagres was only a mountain torrent, but near the top of the three Atlantic locks, called the Gatun Locks, has been built the Gatun Dam, which holds back the waters of the river so that they form a lake of 164 square miles. The section of it through which the ships pass is from 500 to 1,000 feet wide.

The Culebra Cut (*culebra* means *snake*) is now officially called the Gaillard Cut, in honor of Colonel Gaillard, who directed the work of digging it. The hill at Culebra was the greatest obstacle which the Canal builders faced. It is formed of soft volcanic material, and excavating in it resembled in some respects digging water. When a hole was made, more rock and dirt would slide into it from the side, or be thrust up from below by the weight of the hills. Even after the Canal had been opened the slides continued, and navigation had to be stopped several times prior to April 15, 1916. On the whole, instead of removing 53,000,000 cubic yards, as originally estimated, the engineers took out 135,000,000, enough to make a sandpile nearly twice as high as the Woolworth Building, the tallest building in the world, and over half a mile broad at its base. Thus the Cut became three times as wide at the top as had been planned.

Just beyond Gaillard the ship is lowered through Pedro Miguel Lock into little Miraflores Lake, and a mile and a half farther it sinks to sea level in the two Miraflores Locks. Eight miles beyond the last lock the open Pacific is reached, after a voyage of ten hours from the Caribbean. Sea level, however, does not mean the level from which the ship originally came, for on the Atlantic side there are only a few inches of tide, but at the Pacific end the water rises and falls, on the average, eight feet.



CULEBRA (NOW GAILLARD) CUT

Surface water seeping through the soil and gravel at *B* and *C* accumulates on the surface of the layers of clay, creating a line of cleavage. The layers of this accumulation slide down the slope, rising in the Canal at *A*.

How the Canal Was Built. The question of a waterway between the two oceans was of interest to the United States even before the "forty-niners," the early gold seekers, made their way to California, but not until 1902 was the Panama route favored. The treaty of 1846 with New Granada (now Colombia), the Clayton-Bulwer Treaty of 1850 with Great Britain, and the Nicaragua treaty of 1867 guaranteed the neutrality of a canal, but referred equally to all possible routes. In 1855 New York capi-

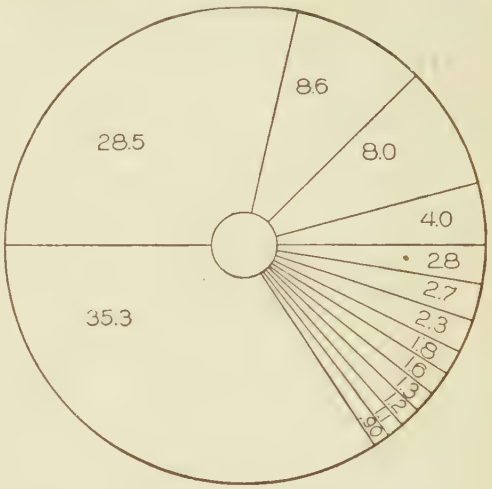
talists built the Panama Railroad, from Colon (then called Aspinwall) to Panama, and in 1881 a French company, headed by De Lesseps, the successful builder of the Suez Canal, commenced to dig the ship passage. This company continued until dissolved by bankruptcy eight years later, when a second company was organized. In all, the French company excavated nearly a third as much ground as the Americans took out later, but less than half of their work was helpful to the enterprise.

When the United States decided to buy the rights of the French company for forty million dollars, the government of Colombia refused to ratify the necessary treaty. As a result the state of Panama, with the help of the United States, secured its independence, and for ten million dollars made a perpetual lease of a strip of land ten miles wide along the Canal route, retaining only the cities of Panama and Colon. This strip is known as the Canal Zone. Besides that initial sum, the United States pays Panama $250,000 a year for its Canal privileges. After unsatisfactory attempts to dig the Canal under private contract, the work was put in the hands of the army. With Colonel (now Major-General) George W. Goethals in charge, the task was virtually completed in 1914, the first ship passing through the canal on August 3. General Goethals then resigned, but temporarily resumed his position when the slides of 1915 interrupted traffic.

The total cost of the work exceeded the $375,000,000 originally set aside for it. This amount includes the $50,000,000 paid to the French company and to Panama. The number of laborers employed in 1912 and 1913, the highest at any one time, was over 40,000, of whom about three-fourths were West Indian negroes.

Sanitary Triumphs. When the Americans went to Panama they found it "one of the hottest, wettest and most feverish regions in existence." By the time the Canal was completed the Zone had a better record for health than many North American cities. This change was due to the untiring efforts of the sanitary department, under Major-General Gorgas, who had previously performed a similar service for Havana. During the early stages of their task the sanitary engineers cut down each year five square miles of brush, drained one-third of a square mile of swamp, cut ten square miles of grass, maintained 550 miles of ditches, emptied 1,300,000 cans of garbage and fumigated 11,000,000 cubic feet of residential space, all to stamp out the mosquito. It was the greatest fight against the pest that has been waged in the history of mankind.

Tolls. Ships passing through the Canal must pay $1.25 for each so-called *net ton* of their cargo, but the charge is made according to space, and by careful loading a boat may carry two or three tons for this sum. In 1912 the



TONNAGE OF A YEAR

The kinds and proportionate amounts of products carried through the Canal in a year are shown in the chart. Figures are percentages:

28.5—Nitrates	1.8—Railroad material
8.6—Refined petroleum	1.6—Iron ore
8.0—Coal	1.3—Canned goods
4.0—Sugar	1.2—Barley
2.8—Lumber	1.1—Copper
2.7—Iron and steel	.90—Wire fencing
2.3—Crude oil	35.3—Miscellaneous

United States Congress ruled that American vessels in the coastwise trade should be exempted from tolls, but other nations claimed this provision to be contrary to treaty, and the next Congress, in 1913, repealed the law, at President Wilson's request.

The United States government has defended the Canal by the best engineering works it is possible to build and by the erection of great guns which are capable of destructive effect at a distance of sixteen miles. C.H.H.

PANAMA-PACIFIC-INTERNATIONAL EXPOSITION, an exposition held in San Francisco in 1915 to celebrate the completion of the Panama Canal. It was authorized by Congress early in 1911. The site chosen lay along the south water front of San Francisco Bay, just within the encircling arm of the Golden Gate. The grounds, 635 acres in extent, sloped towards the bay and were surrounded by an amphitheater of hills. To the north they looked out across the bay to the hills and mountains beyond. To the west was the Presidio, a United

States military reservation, and on the east was Fort Mason. A more desirable site for a great exposition can scarcely be conceived.

The work of planning the grounds and buildings was delegated to a board of architects, with Jules Guerin as colorist. The plan finally decided upon was radically different from the plans of the earlier expositions at Chicago and Saint Louis. In those plans the buildings were the chief units for consideration; in the San Francisco plan the courts around which the buildings were to be grouped were of primary importance. The design for each court was carefully worked out, then the building was designed to harmonize with the court around which it was to be erected. In the center was the Court of the Universe, with a sunken garden which had a seating capacity of 7,000. To the east was the Court of Abundance, with its ornamentation representing Oriental art and architecture; to the west was the Court of the Four Seasons, which typified Western civilization.

The buildings were covered with artificial travertine, which gave them the color of old ivory. This general soft tone was varied with reds, greens, blues and other colors, producing a color effect at once harmonious and brilliant. The crowning feature of the architectural scheme was the Tower of Jewels, 433 feet high and decorated with 125,000 glass prisms of all colors and hues, so mounted that they were set in motion by the faintest current of air. In the sunlight they scintillated like myriads of jewels, and when lighted at night the effect was still more wonderful. The sculpture adorning the buildings and grounds was of the highest order and constituted an important feature of the decorations. Of the larger pieces, the group over the entrance to the Court of Abundance, representing the nations of the East, and that over the entrance of the Court of the Four Seasons, representing the nations of the West, will be long remembered by those who saw them. The *End of the Trail* by Fraser, the *Adventurous Bowman* by MacNeil, and *Victory* by Mary Evelyn Longman are especially worthy of mention among the single pieces.

The exposition was open from February 20 to December 4, 1915. Thirty-seven states and three territories and thirty-nine foreign nations made exhibits. The exhibits were essentially modern, since nothing was listed for award that had not been invented or developed since the Exposition at Saint Louis in 1905. The average daily attendance was over 60,000, and, contrary to the usual outcome of such enterprises, the exposition was a financial success.

PAN-AMERICAN CONGRESS, or **CONFERENCE,** a term applied to a gathering of delegates from the various republics of North and South America, for the purpose of establishing better trade relations and promoting friendly feeling. In general such conferences have been concerned with problems relating to an easier interchange of goods, uniform weights and measures, a common silver coin, a customs union, arbitration and sanitary regulations. Hitherto the sole practical result of such conferences has been the establishment of the International Bureau of American Republics, now known as the Pan-American Union. This Bureau was established at the first conference, called to meet at Washington, D. C., in 1889, by President Cleveland.

The Congress of 1901-1902. The second congress met in the City of Mexico on October 22, 1901. Among the specific suggestions made was that there should be a railroad constructed to connect North and South America. A uniform system of quarantine was favored, also the adoption of a coin to be accepted as legal tender by all American republics. A plan for arbitration patterned after that of the Peace Conference at The Hague was adopted.

The Congress of 1906. The third conference assembled at Rio de Janeiro. The discussion of the Drago, or Calvo, Doctrine was one of the most important matters that came before the body. This doctrine denies the right of governments to collect private debts by force. It was finally referred to The Hague. Other topics which were discussed were the Pan-American railway, the regulation of patents, sanitation, the codification of laws and commercial relations.

The Congress of 1910. The fourth congress opened in Buenos Aires in July. It avoided committing itself in support of the Monroe Doctrine. Considerable difference of opinion developed in the committee on sanitation, Venezuela objecting to the proposal supported by the United States that the condition of ports of departure should be such as to satisfy the nations receiving shipments that they are not menaced by contagious or infectious diseases. A resolution was offered recommending that the members of the congress agree to submit to arbitration all claims for damages presented by their respective citizens which cannot be adjusted by ordinary diplomacy. The name of the International Bureau of American Repub-

lics was changed to the PAN-AMERICAN UNION. (See that title for later information bearing upon the commercial and friendly relations between the two Americas.)

PAN-AMERICAN EXPOSITION, an exposition held in Buffalo, N. Y., in 1901 to celebrate the progress made in industries, science and art by American republics during the nineteenth century. The exposition formally opened on May 20, and closed November 2. The expense of the enterprise, amounting to about $10,000,000, was assumed by the citizens of Buffalo; the buildings occupied 350 acres in the northern part of the city. The electrical power was derived from Niagara Falls. The main buildings were grouped around a broad court, the electric tower, 409 feet high, being the center of the architectural scheme, which was an adaptation of the Spanish Renaissance. The exposition was called the "Rainbow City" on account of its decoration and elaborate coloring. Eighteen countries were represented. The Federal government spent $500,000 in special exhibits. The New York state and Art buildings were permanent, and are now devoted to the collection of the Albright Art Gallery and Buffalo Historical Society. The assassination of President McKinley occurred on September 6, during a reception in the Hall of Music of the exposition.

PAN-AMERICAN UNION, an official organization supported jointly by the twenty-one republics of North, Central and South America, for the promotion of friendly commercial relations between them. It was established in 1890 as the Bureau of American Republics, but its name was changed to the present form in 1910. Its foundation was the result of the Pan-American Congress of 1889, which recommended the organization of a "bureau of information for the dissemination of intelligence concerning the commerce and resources of the American Republics." Through its monthly bulletin and also its annual report, both of which are authoritative documents, the Union now transmits information concerning commercial conditions and opportunities, changes in customs laws and in patent and trademark regulations, and generally acts as publicity agent for all the republics in their relations to each other.

PAN-AMERICAN UNION BUILDING
In Washington, D. C.

Two of the expressed objects of the Union are to secure the adoption of a common coinage basis and the arbitration of all disputes between the various governments involved. This attitude towards arbitration received an impetus in 1914 when the United States representatives of Argentina, Brazil and Chile acted as arbitrators between Mexico and the United States (see MEXICO, subtitle *Government and History*).

The headquarters of the Union, in Washington, D. C., are in a beautiful building, completed in 1910 as the gift of Andrew Carnegie. The Secretary of State of the United States is *ex officio* chairman of the governing board of the Union, whose remaining members are the ambassadors and ministers of the other republics to the United States. The board elects the director-general, who assumes executive control. John Barrett, former minister of the United States to Siam, Argentina, Panama and Colombia, has occupied this office since the organization of the Union, previous to which time, beginning in 1907, he filled the corresponding position in the Bureau of American Republics.

There is a valuable monthly publication for the dissemination of information regarding all matters of interest to the subscribing countries, printed in Washington in English and in Spanish, called *Bulletin of the Pan-American Union.*

PANCREAS, *pang'kre as,* an important digestive organ, the special work of which is the digestion of starches and sugars. It is a long, narrow gland, six or eight inches in length, about one inch thick and an inch and a half wide, and is of a pinkish-yellow color. It lies crosswise and behind the stomach, and communicates with the intestinal tract by means of a duct which extends throughout its length. The contents of this duct are discharged into the duodenum, which meets the pancreas at the right end of that gland. A watery, alkaline liquid, known as pancreatic juice, is secreted by the pancreas, which acts not only on starch and sugar, but on proteids and fats (see DIGESTION). The eating of excessive amounts of sweets, pastry, potatoes, bread and meat tends to overwork the pancreas and to cause diabetes.

Sweetbread, a delicacy sold by butchers, is the pancreas of a calf or other animal.

PANCREATIN, *pang'kre a tin,* a yellowish-white powder given to invalids and old people as a digestive agent. It is a mixture of the elements, or ferments, found in the pancreatic juice and is usually taken from the pancreas of a hog or ox six hours after a meal, when the organ is most active. Pancreatin contains *trypsin,* a ferment which digests meat, eggs and other proteids; *amylopsin,* which turns starch into sugar; *steapsin,* which emulsifies fats; and the enzyme which curdles milk. See PANCREAS; DIGESTION.

PANDO'RA, in Greek mythology, the first woman created. Jupiter was so angered at Prometheus because the latter had stolen fire from heaven that he resolved to avenge himself upon man. So he called upon Vulcan to fashion a being in godlike form from earth and water. All the gods joined in endowing the new being with attractive qualities or those qualified to make mischief. Minerva gave her artist-knowledge, Venus contributed beauty, and Mercury made her artful and designing. The Graces and the Seasons clothed her, and Jupiter christened her Pandora, or *all-gifts.* Thus endowed, the new creation was sent to Prometheus, who received her coldly, for he was suspicious of gifts from the gods. Then Mercury took her to Epimetheus, who was much more trustful than his brother. He married her and was happy until Mercury brought a box which he confided to the care of Pandora, with strict injunctions that she should not open it. Her curiosity, however, was too strong, and she undid the fastenings. Then at once there burst out all the vices, sins, crimes and sufferings that can afflict man, for Jupiter had seen that the box was well filled. Frightened at what she had done, Pandora hastily shut down the lid in time to retain and preserve for man Hope, which always follows suffering and is the chief consoler of the race. Other legends tell the story somewhat differently, but with the main statements unchanged. See illustration, in article MYTHOLOGY.

PANK'HURST, EMMELINE (1858-), an English militant suffragist whose spectacular methods and intense devotion to the cause of equal suffrage have given her an outstanding place in twentieth-century social records. Her father, Richard Goulden, and her mother zealously advanced the doctrine of votes for women when the movement in England was in its infancy. Their daughter Emmeline was born in Manchester and educated there and in Paris. Mrs. Pankhurst, who is the widow of Dr. Richard Marsden Pankhurst (died 1898), was actively interested in various social reforms long before her marriage to him (1879). She was one of the founders of the Women's Franchise League, organized in 1889, and of the powerful Woman's Social and Political Union, founded in Manchester in 1903. It was about two years later that she and her followers inaugurated the militant tactics that made them known the world over.

EMMELINE PANKHURST
The world's most conspicuous advocate of woman suffrage.

At first this militancy was comparatively mild, consisting of the "heckling" of public speakers, the organization of monster parades and various demonstrations that were regarded by the police merely as disturbances of the peace, but after 1912, when the hostility of the Cabinet to the cause was unmistakably apparent, a new campaign was inaugurated. The militants began to set fire to buildings, damage golf links, pour noxious fluids in mail boxes and break the windows of public edifices. Mrs. Pankhurst, the chief instigator of these outrages, was sent to jail early in 1913 as an accomplice in a plot to destroy Lloyd George's country home with a bomb, but she was as troublesome in jail as out of it. Hunger strikes and enforced feeding seriously injured her health, and she was soon released, only to be committed for a new outrage. This occurred several times, until the summer of 1913, when she succeeded in making her way to Paris. From there she sailed to America, where she engaged in a lecture tour before returning to England. In 1914 the outbreak of the War of the Nations suspended the activities of the militant suffragists.

Mrs. Pankhurst's two daughters, Sylvia (born 1882) and Christabel (born 1880), are both active workers for political equality, and both have lectured in the United States and Canada.

PANSY, *pan'zi,* the "flower with a face," has five petals so arranged and so marked that to the beholder it almost seems like a child's face. The leaves are long, cut in the edges, and

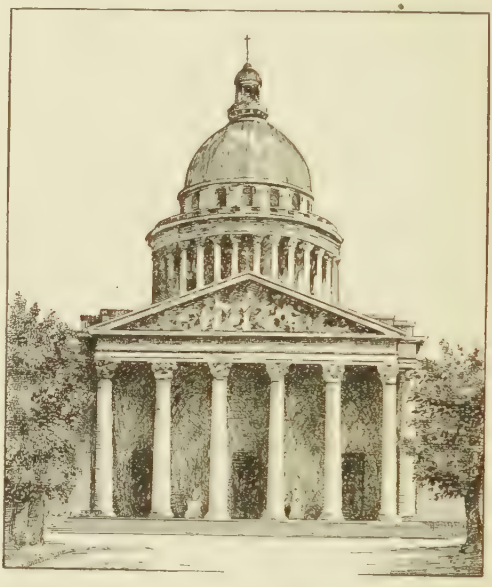
sharp-pointed. Both flowers and leaves grow on slender stalks which may reach a foot in height, but usually are about half that length. Almost three hundred years ago, in Europe, someone loved a shy, wild violet and carried the plant to a cool, moist spot in a garden. There, sheltered from strong winds and warmed by the morning sun, fed by rich soil, it grew larger and more beautiful. So, from that great-great-grandmother violet of long ago, through continued selection, have come the velvety purple, violet, blue, yellow, white and brown pansies of to-day. Pansies are very hardy, and easily and cheaply grown. They are so hardy, in fact, they have been known to brave the winter weather and peep up through the snow. From the French word *pensée,* meaning *thought,* has come the expression, "pansies for thoughts." See VIOLET.

Of all the bonny buds that blow
In bright or cloudy weather,
Of all the flowers that come and go
The whole twelve moons together,
The little purple pansy brings
Thoughts of the sweetest, saddest things.
—BRADLEY: *Heart's Ease.*

PAN'THEISM, the belief that God and the material universe are one and the same thing, and that God does not exist as a separate spiritual being. The Dutch philosopher, Baruch Spinoza (which see), was the most prominent of modern scholars who accepted this doctrine. In the poetry of Bryant, Wordsworth and other nature poets we find suggestions of a pantheistic view of God and the world. The term *pantheism* is sometimes used in the sense of *worship of many gods.* It is derived from two Greek words meaning *all* and *god.*

PAN'THEON, in general, any temple dedicated to all the gods, but more specifically a very famous temple of that type in Rome. The original Pantheon, built in 27 B.C., was destroyed by lightning, and the present structure was built in A.D. 123 by Hadrian. Later emperors altered or added to it, so that it became what it is to-day—the finest architectural work of the ancient Romans. It is circular in form, 142½ feet in interior diameter, and possesses a great dome, the apex of which is 142 feet above the floor. The only light which enters the building comes from a window 27 feet in diameter at the summit of the dome. A most striking feature is the portico with its sixteen great Corinthian columns each hewn out of a single stone. The Pantheon is in an almost perfect state of preservation, and has been used since the seventh century as a Christian church. Raphael is buried there.

Among modern buildings which bear this name the most celebrated is the church in Paris which is more correctly styled the Church of Saint Geneviève. The rabid revolutionists desecrated the building, and to show their contempt



THE PANTHEON, IN PARIS

for Christianity and their preference for the heathen faith, called it the Pantheon. It has been reconsecrated as a church, but the name persists. Many great men are buried in the Pantheon.

PAN'THER, a name used somewhat loosely to designate certain members of the cat family. It is applied to the *leopard,* which is a native of Asia and Africa, and to the *puma* of North America, known also as the *cougar* and the *American lion.* Some authorities apply the name only to large leopards, but this distinction is not commonly observed. Full descriptions of the leopard and the puma will be found in these volumes under the proper headings.

PANTOMIME, *pan'toh mime,* a term derived from Greek words meaning *all mimic.* It was not, at first, the name of a kind of play,

but signified the actors. To mimic by action is a necessary element in dramatic representation, other elements being narrative, music, dancing, etc.; one way of classifying dramatic performances is the relative importance of these elements. In an opera, singing, music and dancing are expected, but there is little narrative. In early days, pantomime was the name of a class of performances in which mimicking by gesture was the important element.

It cannot be told where pantomime was first employed; it reached very different stages of development at different times and places. In the first age of the Roman Empire it was very popular; no narrative was employed, the play being acted out by gesture and dancing, accompanied by music, the actors wearing masks. The mimicry was so skilful that the story was well understood by the audience. In pantomime so much in vogue in England during the seventeenth century and later, the actors always represented conventional characters and names. There was always a *harlequin* or clown; an amiable but stupid father, *Pantaloon;* a sprightly daughter, *Columbine,* and so on. The performance was of the vaudeville order, interspersed with music, dancing and acrobatic feats. The subject-matter of the play was some folklore story like *Jack, the Giant Killer.* To-day, pantomime relates almost wholly to a short play in which there is no spoken word. The moving-picture stories thrown on the screen are good representations of pantomime.

PAPAL, *pa'pal,* **STATES,** or **STATES OF THE CHURCH,** a dominion of several provinces and cities, including Rome, in the central part of Italy, which from 755 to 1871 was directly under the rule of the Pope of Rome. The "temporal power of the Pope" is thus explained and its period in history fixed. A part of this territory was originally given to Pope Stephen II by Pepin the Short of France, who wrested it from the warring Lombards. Charlemagne, Pepin's successor, confirmed and enlarged the gift, and was in turn crowned in spectacular magnificence in Rome by Pope Leo III and given the support of the Church in his campaign for power in Western Europe.

This interchange of authority worked very well during the lives of Charlemagne and Leo, but led to endless strife between the Popes and kings of later centuries. After the Reformation, the political power of the Pope gradually declined, and in 1860 the Papal States, with the exception of the land immediately about Rome, became subject to Victor Emmanuel, King of Italy. Ten years later Victor Emmanuel entered Rome and asked the citizens to decide by popular vote whether or not the city should become the capital of a united Italy. By a large majority the Pope's rule was rejected, and his temporal authority has since been limited to the Vatican. See ROMAN CATHOLIC CHURCH.

PAPAW, *pa paw',* or *paw'paw,* a form of the word PAWPAW (which see).

PAPER. Every country lad has had experiences with wasps and hornets, but boys have probably never looked upon these troublesome insects as the first paper makers. However, a careful examination of a wasp's nest will convince one of this fact, and it is said that the study of one of these nests first suggested the possibility of the use of wood for making paper. Paper is so common in every household that we seldom consider its value, yet what would we do without it? If we were deprived of paper the printing industry could not continue; we would have no more newspapers, books or magazines, and some other substitute would have to be found for wrapping for parcels.

Paper, which has become one of the world's most useful commodities, is the result of centuries of study, experiment and invention. It has always been associated with man's intellectual development, and its invention is due to repeated attempts to produce a substance on which man's thoughts and achievements could be recorded. The first of these attempts of which there is any record was that of the ancient Egyptians, who prepared from the stems of the papyrus plant a tissue on which they recorded the deeds of their rulers and other royal personages. Many of these ancient records, called *papyri,* have been found in Egyptian tombs.

The Chinese manufactured paper at least two centuries before the birth of Christ, and passed on their secret to the Arabs, who introduced the art into Spain in the middle of the twelfth century. This early paper is referred to by writers of the period as cloth parchment, now known as *vellum.* By the second half of the fourteenth century the use of paper for literary purposes had become general in Western Europe, and vellum was gradually driven out. The earliest preserved English manuscript bears the date of 1309, but paper was not manufactured on the island until the beginning of the sixteenth century. In America a mill was set up near Philadelphia in 1690, but a good many

years elapsed before the United States finally reached its present position at the head of the world's paper industry.

Manufacture. In the United States and Canada wood fiber is more plentiful than all other vegetable fibers. The chief raw materials from which paper is made are spruce, hemlock, poplar and pine woods, rags, straw and old paper; but three-fourths of the entire output is now manufactured from wood pulp. The value of rag paper is a little higher than that of paper made from wood, but it amounts only to about five per cent of the gross tonnage. Cotton and linen rags were the first material of which paper was made, the process then being almost exclusively a handcraft. The rags were cleaned, soaked, reduced to a pulp by beating and grinding, and floated on water that was kept in motion to distribute the fibers evenly.

When the natural structure of a fibrous substance is broken down, the filaments mat easily. The surface of the water is thus coated with a thin film or tissue of cellulose, which may be described as the skeleton of plants. In the earlier process this film was dipped from the water in shallow boxes, fitted with a wire mesh bottom, through which the water was allowed to drain. Such boxes were called *deckles*. The sheets of forming paper were turned out on beds of woolen felt. Layers of paper and felt were placed one above another, and the whole was placed in a press where the remaining water was squeezed out. The sheets were then hung up to dry, finished by sizing with glue or gelatin and rendered smooth by pressure. Machinery has now been substituted for hand labor in the manufacture of paper.

Whatever the fiber used, the process described above is essentially that used in making paper. When wood is substituted for rags, the first steps of the process consist in cutting logs to lengths of from twenty-four to thirty inches. In the commonest process the wood is then forced by water pressure against a revolving grindstone in such a way that the fibers are torn from it obliquely. The pulp is strained and passed on to the beating engine, where it is further macerated with revolving knives. At this stage color and sizing are added, in addition to a certain quantity of chemical, or "sulphite," pulp, and a percentage of clay to act as filling matter and give a smoother surface. The sulphite pulp is produced by treating the wood with a solution of sulphurous acid. A process of cooking in vats then reduces the pulp to an approximately pure cellulose fiber. If the wood is not treated with acids, the resulting paper is of inferior grade. In the so-called soda process, caustic soda is substituted for bisulphite in the cooking vats. Paper so made is dark in color and less durable than that made with sulphite.

The pulp, once refined, bleached and colored, is ready for the paper-making machine. At the present time the Fourdrinier machine, a delicately adjusted and most complicated piece of mechanism, is almost exclusively in use. It consists of three essential parts: the "wet" part, the "drying" part, and the finishing rolls, usually known as the calender rolls. The wet stock is allowed to flow through a wide aperture upon an endless wire screen, which moves forward continuously. The speed at which it moves determines the thickness of the resulting paper. The width of the paper is determined by the distance between the "deckles," or rubber bands, placed at either edge of the screen. By the time the film of pulp has passed the length of the screen, it has lost enough water and is felted, or twined together, sufficiently to be transferred from the wire, over movable belts of felt, to the pressing machine, which consists of heavy rollers adjusted in pairs. Having passed through the pressing machine, the thin tissue of paper is conveyed on endless belts through a number of iron cylinders, arranged in horizontal tiers and heated by steam. These are the "dryers." The final process of polishing and smoothing is accomplished by running the paper between the calender rolls. It is delivered to city newspapers in massive reels weighing about 500 pounds each.

Classification. Paper is used for three purposes, namely, writing, printing and miscellaneous industrial use. Under the latter head, its chief uses are for wrapping, making paper boxes, etc. Linen paper is favored for writing and for documents which have to be preserved for long periods of time. So-called linen papers contain, for the most part, only a small proportion of linen, the chief element being really wood pulp. Most newspapers, magazines and books are manufactured entirely of wood-pulp paper, the quality being usually slightly better in the case of bound volumes. Manila paper is made from jute, hemp and other stout fibers, and there is on the market a so-called manila manufactured from wood. The variety known as "boards" is used largely in bookbinding. Straw paper is used for wrapping and other rough purposes. The so-called watermark, by which most superior grades of paper are distinguished, is impressed on the web while it is

passing over the rollers. It can be seen by holding the papers between the eyes and the light.

Paraffin or "waxed" paper is made by running ordinary paper through a tank of melted paraffin, and then pressing the paper between cold steel rollers. Vegetable parchment is made by running the paper through a solution of sulphuric acid and other ingredients, then washing, drying and finishing as in other papers. Both these varieties are waterproof, and the waxed paper is extensively used in wrapping butter, bread and other food products.

As might be expected in a country where almost everybody reads, America leads the world in paper making. The capital invested in the business amounts to more than $400,000,000. The value of the annual output is approximately $789,000,000. The wood consumed for pulp yearly is over 5,000 000 cords. Production is largely concentrated in the northern tier of states, especially in the East. The news-print production of Canada has been greatly increased of late, and its output is nearly half that of the United States. The War of the Nations had a disturbing effect on the production of paper. Its manufacture stopped in Belgium, the English and French output was cut nearly in half, and the German mills reduced their output to less than one-fourth that in normal times. In America no serious effect would have been felt had not the importation of chemicals, especially from Germany, been stopped. All papers had doubled in value before the war had continued two years. W.F.R.

Related Subjects. The reader is referred to the following articles in these volumes:

Books and Bookbinding
Newspaper
Papyrus
Printing
Vellum

PAPIER-MÂCHÉ, *pa pya' mah shay',* a substance made of paper pulp or paper that has been reduced to pulp. The pulp is mixed with oil, glue, paste, resin or some other sizing to make it hold together when dry. Copperas, quicklime or white of egg is added when it is desired to make the substance resist water, and the addition of borax and phosphate of soda renders it fireproof. Papier-mâché was probably first manufactured in India, China and Japan. Its manufacture in the United States is of recent origin, but it has become an important industry.

There are many uses for papier-mâché. It is molded into masks, dolls' heads and other toys, trays, bowls, relief maps, artists' models, anatomical models, picture frames, buttons, boxes, tubes, pails and numerous other articles of common use. It is sometimes used in place of stucco for ornamenting the interior of buildings. Papier-mâché is a desirable material for manufacturing purposes because it is comparatively inexpensive, light, strong and durable, and can easily be molded into any desired shape. When dry the article is tight and strong, and can be painted or otherwise decorated to suit the taste of the maker.

For some purposes papier-mâché is made by gluing together sheets of paper and pressing the damp sheets into a mold. For other purposes sheets of cardboard or box board are similarly treated, but the ordinary grade is made from scrap or waste paper or wood pulp, to which quantities of ground chalk, clay and sand are added.

PAPINEAU, *pah pe no',* Louis Joseph (1786-1871), a French-Canadian political leader, from 1815 to 1837 speaker of the Lower Canadian Assembly, also remembered for his share in causing the Lower Canada Rebellion of 1837. To the end of his life he always maintained that Canada should establish its political independence, for Canadians, he said, "need never expect justice from England, and to submit to her would be an eternal disgrace." This opinion is the keynote to his political career, during the course of which he was continually stirring up feeling against the home government. Always in deep earnest, Papineau's course was laid with the welfare of Canada as an objective. Unfortunately Canada to him meant only French Canada. Had his vision been a wider one he would probably have been one of the constructive leaders of Canada during the nineteenth century.

LOUIS JOSEPH PAPINEAU

Papineau was born at Montreal, attended the Seminary of Quebec and later studied law, being admitted to the bar in 1810. His law practice, however, never was great, for he had already entered public life in the preceding year as member of the Lower Canada Assembly. In that body he served without interrup-

tion until 1837, and after 1815 was also Speaker. The twenty-two years of his Speakership were perhaps the stormiest in Canadian history. He himself had frequent disputes with the governors appointed by the Crown, until finally, in 1827, Lord Dalhousie refused to accept him as Speaker. When the Assembly insisted, Dalhousie resigned.

Thereafter Papineau was more than ever a popular idol. Previously, from 1820 to 1823, he served on the executive council, but he resigned because he realized that public opinion did not and could not make itself felt in that body. In 1834 the Assembly, under his leadership, refused to grant supplies to the governor as a step towards forcing the British government to grant an elective council. For three years the Assembly continued to refuse supplies, and in the meantime Papineau arranged with William Lyon Mackenzie for coöperation between the revolutionary parties in Upper and Lower Canada. Early in 1837 the British government announced that an elective council was out of the question, and also, as the Assembly still refused to vote supplies, authorized the governor to withdraw money from the treasury. This action was followed by violent speeches from Papineau, and finally, in October, by open rebellion.

Papineau's attitude towards the rebellion has been the subject of much dispute. It was no sooner begun, however, than he left it to its fate and fled across the border into the United States. After two years he went to France, where he remained until the general amnesty of 1847. On his return to Canada he was elected to the Assembly of the Union, but his influence over his fellow members and over the general public was gone. He retired in 1854, and spent the remaining years of his life in seclusion at his home, Montebello, on the Ottawa River. W.F.Z.

PAPRIKA, *pah'pre ka,* a favorite Hungarian condiment, prepared from the pods of a cultivated variety of capsicum (which see). After the seeds have been removed, the pods are dried and powdered. Paprika has a bright red color, but is less pungent than red or cayenne pepper and has a sweeter taste. It is used for seasoning edibles, especially dishes prepared from a combination of meats and vegetables as goulashes, stews, etc., and is also employed in salad dressings. It has come into very common use in North America.

PAPUA, *pap'oo ah,* or *pah'poo ah.* See NEW GUINEA.

PAPYRUS, *pa pi'rus,* a water plant of the sedge family, whose most important representative, the *Egyptian papyrus,* has enabled man to preserve from oblivion the records of dynasties that have long since passed into history. The reed was used by the ancients for a variety of practical purposes in addition to the most important one, the manufacture of the crude but long-enduring *papyri* rolls which modern

TWO FORMS OF THE PAPYRUS PLANT

research has brought to light. It served also to make mats, sandals and sailcloth for light skiffs. Even the brownish flowers were utilized to form garlands to adorn the shrines of the Egyptian gods.

The papyrus, or paper, of the Egyptians was made of strips of the pith arranged in layers. It appears on the earliest monuments in the shape of long, rectangular sheets. The writer used a reed called *kash,* with red or black ink whose formula is unknown to-day. The sheets were at first rolled and tied with a string; later they were bound together like the modern books. These rolls and sheets varied in dimensions; in many instances they reached a length of 144 feet. When newly prepared, the papyrus was white, but time has turned those which have come down to us a light or dark brown, and age has made them very brittle.

For a long time the city of Alexandria jealously guarded the monopoly of preparing the

paper, and the refusal of the Egyptians to supply it to Europe was one of the causes which led to the employment of other substitutes. It continued to be used in the Eastern and the Western Empire until the twelfth century; but after that period was superseded by parchment and by paper made of rags.

The plant is nearly extinct in Lower Egypt. However, it still grows in the Jordan Valley, in the neighborhood of Jaffa, in parts of the Sinai Desert and in Sicily. It is a large plant with straight stems, which grow from four to sixteen feet in height; it bears no foliage whatever, the coarse, sharp-edged leaves springing directly from the rootstock. The flowers are lacking both in sepals and petals, but are surrounded by bristles. In recent years the cultivation of papyrus for paper has been resumed on a small scale in the Nile delta. A plantation near Alexandria has been sown, and the harvest transmitted to an English paper mill, where it is manufactured by modern machinery into a paper of good quality. The papyrus fiber is also used in the manufacture of rope, sailcloth, sandals, coarse garments and mats. R.D.M.

PARÁ, *pah rah',* or **BELEM,** *ba leN',* the capital of the province of Pará, in Brazil, and one of the greatest rubber markets in the world, is situated in the northern part of the country, about eighty-five miles from the Atlantic Ocean, and on the eastern bank of the estuary of the Pará River. Pará is one of the most delightful cities in Northern Brazil, having unusually attractive buildings and homes and a picturesque setting in the midst of a great tropical garden, back of a spacious bay. "Who goes to Pará stays there," is a common saying in Brazil. It has all the institutions and public buildings common to a modern, progressive city; its Theatro da Paz is one of the finest opera houses in South America. To the safe, deep harbor is due the commercial activity of the city. Trade in cotton, dyewoods, wax, honey and a variety of vegetable and animal products is extensive; most of the cacao, isinglass, rice and drugs exported from Brazil come from Pará. There is rail connection with Bragança, on the Atlantic coast. Population, 1920, 275,167.

PARABLE, *par'a b'l,* a short story which uses incidents and facts of everyday life to illustrate a moral or spiritual truth. It is a form of allegory (which see). Greek and Latin writers make wide use of the parable, but the finest examples of this form of literature are found in the Bible.

One of the best-known Old Testament parables, told by Nathan to David, is that of the poor man's one ewe lamb, which the rich man seized and killed when a traveler called at his door for food. When David became angry at the rich man's cruelty, Nathan turned upon him with the words, "Thou art the man" (*II Samuel* XII, 1-7).

Jesus made use of many parables in His teachings. The parable of *The Good Samaritan* (*Luke* X, 30-37), the story of a wayfarer who helped a stranger that had fallen among thieves, illustrates the spirit of true neighborliness.

There are several parables in *Matthew* XIII which illustrate the growth of the Kingdom of God among men; these include the parables of the mustard seed which grew into a great tree, of the leaven that made light the whole loaf, of the wheat and the tares that grew together until the harvest, and of the sower who sowed seed in the different kinds of soil.

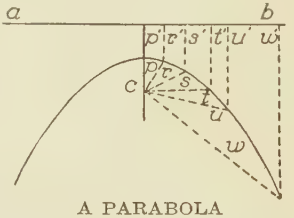
Three parables in *Luke* XV picture the joy felt in heaven over a wanderer's return to the Kingdom; these are the parables of *The Lost Sheep, The Lost Coin* and *The Prodigal Son.*

The parable of *The Ten Virgins* (*Matthew* XXV, 1-12) illustrates two classes of people who desire citizenship in the Kingdom. Five met the conditions and were admitted, but five failed and found that the door was shut.

The New Testament parables have inspired many beautiful hymns.

Consult Dods' *Parables of Our Lord;* Murray's *Jesus and His Parables.*

PARABOLA, *pa rab' o la.* If you are playing baseball and hit a high "fly," the ball rises at first rapidly, then more slowly, then curves more and more toward the earth until at last it is coming almost directly downward. But for the effects of friction with the air, the curve which the ball follows in descending would be exactly the opposite of that by which it ascends, and the whole curve from the time the ball is hit till it is caught would be a *parabola.* Exactly described, a parabola is a curve in which every point is equally distant from a certain point and a certain straight line. In the case of the ball, the point would be some-



A PARABOLA

Any point in the curve is as far from the line *a b* as it is from the point *c.* Thus, *p* equals *p'; r* equals *r',* etc.

where directly under the highest point reached, and the line would be a horizontal one above this highest point. Another definition of a parabola describes it as the section of a *right circular* cone made by a plane parallel to a line on the slanting surface of the cone. The parabola is studied in analytical geometry; see GEOMETRY.

PARACELSUS, *pair a sel'sus* (1493-1541), a German physician who is remembered chiefly for the new impetus he gave to medical investigation. He was born at Einsiedeln, in Switzerland, and in his boyhood was educated for the profession of medicine by his father, himself a physician and chemist. Paracelsus later attended the University of Basel for a brief period, and then, after studying chemistry and alchemy under the learned bishop of Würzburg, began an independent career. He wandered about Europe, learned all he could, including in his investigations the study of metals and their relationship to medicine, and gained a reputation through many marvelous cures. From 1526 to 1528 he lectured at the University of Basel, but was dismissed because of his denunciation of existing methods in medical practice, his scorn of all accepted traditions and his dissolute personal habits. Thereafter he lived a wandering life, stirring up opposition wherever he went. Several stories are told to account for his death at Salzburg, in 1541. One commonly heard is that he was thrown from a window by the servants of a physician who hated him, and that his neck was broken by the fall.

While Paracelsus is credited with no single important medical discovery, he deserves honor as an original investigator. He showed the fallacy of the accepted belief that people were made sick by too much or too little bile or blood, and he laid the foundation for the later method of curing diseases by specific remedies. Pharmacy and chemistry are both indebted to him, and he introduced into medical practice, among other remedies, sulphur, iron, arsenic, opium and mercury.

PARACHUTE, *pair'a shoot,* a word meaning *to render a fall harmless,* is an invention in the form of a large umbrella, used to break the fall of a person from a balloon or from any great height. The principle embodied was well understood in early times, and acrobats are said to have used the device in certain acts. After balloons were invented, parachutes were used as a means of descent from them. Some years ago balloon ascensions and descent by means of a parachute were common features at county fairs. The parachute was attached by means of a rope to the basket below and remained closed when the balloon rose; but when it was cut loose and the descent began, the air forced it open, just as wind will blow an umbrella open, and thus the fall was checked.

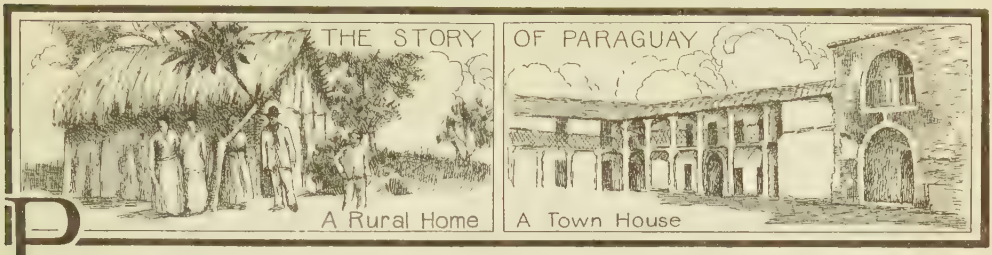
Several methods have been devised to fasten a parachute to the operator of a flying machine so as to break the fall in case of accidents. Experiments have shown this to be possible, but there are disadvantages connected with the plan which have yet to be overcome. The operator sits surrounded by a mass of wires, with broad wing expanse above and below him, if he is in a "biplane," or is well down in a surrounding basket, if in a "monoplane," and operation of a parachute under such conditions is difficult.

PAR'ADISE LOST, the name given by John Milton to his great epic in which he describes the fall of man. One critic calls it "perhaps the loftiest monument of human genius," and all agree that it ranks with the greatest poems the world has ever known—with the *Iliad,* the *Divine Comedy* and *Faust.* Milton, who wrote the poem after he had become blind, had had the production of some such work in mind for many years, and had considered many subjects, among them the Arthurian legend; but he chose the Biblical narrative as the only theme lofty enough. For sustained majesty no other poem equals it. See MILTON, JOHN.

PARAFFIN, *pair'a fin,* a hard, white, tasteless and odorless substance that resembles wax and is used to a great extent in making candles. For this purpose it is mixed with small quantities of stearin (which see). Among other uses it is employed in the manufacture of matches and of wax paper, is used to give weight and luster to calicoes and other fabrics, and to extract oils from plants and flowers, and is a frequent adulterant in chewing gum. Although paraffin occurs in nature in the mineral ozocerite, the greater part of the commercial product is obtained by distillation from petroleum. In Germany, it is prepared by distillation of various kinds of brown coal, and in Scotland, an important center of the paraffin industry, it is manufactured from boghead coal and bituminous shales. Paraffin oil, benzine and asphalt are important by-products obtained in the manufacture of paraffin, and oil gas, which is obtained from paraffin oil, is used to a considerable extent in illuminating ships and railroad cars and to improve the quality of coal

gas. The commercial importance of paraffin dates from 1850, when the Scotch chemist, James Young, perfected a practical method of manufacture. In recent years paraffin has become a household necessity for the sealing of jellies and jams.

In chemistry, *paraffin* is a general term for a group of hydrocarbons (which see).



PARAGUAY, *pair'a gwa,* or *pah rah gwi',* a small South American country enclosed by Brazil, Argentina and Bolivia and thus shut off from the ocean, is to most persons a land of strange contradictions. With a history reaching back through nearly four centuries, it seems now to be, economically, just at the beginning of its career. Possessing a free constitution from 1811, it remained until 1870 under the absolute despotism of a single family (see subhead *History,* below). Converted to the Christian religion with astonishing unanimity, and with no employment of violence, in the greatest missionary success in all the history of the Americas, it largely relapsed into barbarism. Vigorous in physique and under wholesome natural conditions the country began to prosper again, when between 1863 and 1871 the Paraguayans lost five-sixths of their population in a most frightful war, much of the country, through the extermination of the men, being left with only women and children.

Paraguay's first exploration and settlement present an enigma. Why should adventurers, nearly four centuries ago, pass by the inviting lands on or near the coast and penetrate the far interior, establishing a city on the site of Asuncion before they had built one on the coast? The answer is found partly in the hope that the Paraguay River would supply a new outlet for the treasure from the mines of Bolivia, and partly in the marvelous results which attended the labors of the early missionaries.

This hope may yet be realized to a large extent, after all these centuries of waiting; such a route for the commerce of the eastern slope of the Andes will have the advantage of lying in the south temperate zone, whereas the route of commerce through the Amazon and its branches lies in a region of fierce tropical heat and unhealthful conditions.

Notwithstanding its long history, Paraguay must be regarded to-day very largely as a virgin land, one of those promising fields for new development so greatly needed for supplying the wants of the world, and yet without the repellant features of hardship which pioneers generally find in lands that are wholly new. Agassiz was impressed with the idea that the interior of South America, of which Paraguay forms an important part, would eventually be the center of the world's civilization; and his optimistic prediction may yet prove to have been well founded.

The area of Paraguay is 196,200 square miles, being somewhat smaller than that of California. The population is about 1,000,000. Over half a century ago it was more than one and one-third millions, and it is now increasing rapidly again under the favorable conditions of the present time.

Physical Features. The upper Paraguay River separates the country into two principal divisions. A range of highlands, never exceeding 2,300 feet above the sea level, runs north and south through much of what is called Paraguay proper, east of the Paraguay River; to the south, the land becomes marshy. The Pilcomayo River, which flows down from the northwest through a region of low, wet, wooded or grassy plains, is navigable in both its upper and lower courses, but shallow in its middle course. The Parana River, which forms the southeastern boundary of the country, has a succession of noble cataracts, and for a hundred miles is a continuous chain of rapids; the islands of Yacireta and Yasyrenta in this river belong to Paraguay.

The People and Their Cities. That a people so long Christianized, in many respects differing so little from their progressive neighbors and requiring much the same imports, should

possess a land so new in development is to be explained only by their unparalleled history. The body of the rural population is of the aboriginal, or "Indian," race, known as *Guarani*. They have been brave, sincere, and passionately devoted to their native land. In the rural districts their dress is of the simplest character. The women wear a mere tunic of cotton cloth, and a *manta* of the same material—a scarf arranged to form both a sort of Oriental headdress and a wrapping for the shoulders. The men go barefoot, and their dress consists of a shirt and trousers. In their simple life they practice the primitive Christian virtues. The people of the cities and villages, who are generally of mixed blood, constitute a very large part of the population. In the cities there is an earnest desire for all the benefits of modern progress; and despite the poverty in which the country was left in 1870, the people are making earnest efforts to develop their resources and are inviting immigration to their land of great opportunities.

LOCATION MAP

One of the two South American countries without a seacoast. The map shows the size of Paraguay compared to the entire continent.

About 50,000 aborigines live in their primitive way in the partially unexplored regions. There are approximately 60,000 inhabitants of foreign birth, chiefly Italians and Argentines. In 1893 a colony of Australians founded a small experimental settlement on an optimistic and sociological basis, and named it New Australia. It still exists.

The chief cities are Asuncion, with a population of 99,836; Villa Rica, 28,750; Concepcion, 15,683; Carapegua, 15,000; Villa Encarnacion, 12,526; Paraguari, 10,000; Caazapa, 9,000; San Pedro, 8,700; Villa del Pilar, 7,247; and Humaita, 4,205. There are 126 towns and villages in the country. The names of several of these cities indicate the piety of their founders. The more recent architecture is strikingly modern in style, and is highly suggestive of the spirit of progress and popular confidence in the future.

The main railway of the country starts northward from Villa Encarnacion, on the Parana, at the southern boundary, and passes northward to the central city of Villa Rica, thence northwestward to the capital, Asuncion. Extensions and branches are now under construction.

Products and Commerce. "Economically," says a recent writer in the *Bulletin of the Pan-American Union*, "Paraguay is at the very beginning of things. It might have been discovered but yesterday." It exports to its neighbor, Argentina, a little fruit, *yerba maté*, tobacco and live cattle. The rest of the world knows it as a producer of hides, tanning extracts and oil of orange leaves (petigrain). Its immense possibilities as a food producer are practically unknown and undeveloped. The cattle industry in Paraguay is scarcely out of the stage when the animals are slaughtered for their hides alone.

Paraguay tea, or *yerba maté*, is obtained from an evergreen shrub of aromatic character, the leaves and stems of which, when burned on hot plates, supply a powder that is dissolved in hot water to form a popular beverage for the table. See MATÉ.

A North American company has contracted to construct important improvements at the port of Asuncion, comprising docks, loading and unloading appliances and the reclamation of land about the harbor. This city is situated about 650 miles north of Buenos Aires, and here the river is over 1,800 feet in width, forming a superb harbor, from which steamboats run direct to the Atlantic coast.

The principal industry of Paraguay is the raising of beef cattle; the number of cattle now possessed in the country is estimated at from 5,000,000 to 6,000,000. Cattle in Paraguay sold for but little more than the value of their hides until increased world demand in 1915.

Manufactures are represented chiefly by the packing and curing of meat, the distilling of rum, the making of raw sugar and the tanning of leather. These products are generally for home consumption. The cities of Paraguay require about the same articles of manufacture that are imported by Argentina. With the development of agriculture will come a greater need for agricultural machinery and implements. Ranching now offers inducements to capitalists, and the public improvements to be made should continue to attract North American contractors and artisans. Motor boats and automobiles are already supplied by enterprising North Americans for transportation along

Outline and Questions on Paraguay

I. Location and Size

(1) An inland country
(2) Crossed by Tropic of Capricorn
(3) Area
  (a) Actual, 171,770 square miles
  (b) Comparative

II. The Land

(1) Two principal divisions
(2) Highlands
(3) Rivers

III. The People

(1) Population, about 800,000
(2) Racial characteristics
(3) Dress
(4) Cities
(5) Education and religion

IV. Industries and Commerce

(1) Possibilities of the country
(2) Limited production
(3) Crops
  (a) Maté
(4) Stock raising
(5) Manufactures
(6) Preponderance of imports over exports

V. Government and History

(1) Centralized republican form of government
(2) Discovery and early settlement
(3) Christianization
  (a) Work of Father Solano
(4) Expulsion of Jesuits, and lapse of people into barbarism
(5) Independence secured
(6) Dictator presidents
(7) Disastrous wars
(8) Modern progress and needs

Questions

What advantage has a coastward route along the Paraguay River over a route along the Amazon?

Describe the dress of the women and of the men in the rural regions. What are some of their moral characteristics?

Who was "the Apostle of Paraguay," and what did he accomplish? How was the excellent work of the Jesuits undone?

What is the problem that presents itself when the original settlement of Paraguay is considered?

How do historians account for the choice of location?

What countries of South America have an area smaller than that of Paraguay? How many have a smaller population? How many states of the United States are larger?

What is reckoned the most valuable part of cattle in Paraguay?

When did Paraguay become independent? Why could it scarcely be called a republic during the first sixty years of its existence as a free country?

What did a great naturalist think of the possibilities of the region of which Paraguay forms a part?

What is *yerba maté*, and how is it prepared and used?

When did the country have almost four times as many women as men? What was the cause of this condition of affairs?

What President practically ruined the country? How did he do it?

the natural lines of travel, and there will be need for many more.

Education. Elementary instruction is free, and is in theory compulsory, but laws compelling attendance are not well enforced. There are private schools and Church schools for the children of the well-to-do. There are about 1,300 public schools in the country. The state maintains a national college at Asuncion.

Government. Paraguay is a centralized republic, the executive being a President chosen directly by the people, and the legislature consisting of a Congress of two houses, both elected directly by the people. The Roman Catholic Church is supported by the state, but other religions are tolerated.

History. The city of Asuncion (which see), piously named in honor of the doctrine of the Assumption of the Virgin Mary, was founded in 1535 by De Ayolas, Sebastian Cabot having erected a temporary stockade eight years before. The marvelous career of the missionary, Father Solano, the "Apostle of Paraguay," lasted from 1542 to 1560. He was a member of the Franciscans. The Jesuits were in charge of the Church from 1605 to 1769. The children of the natives were taught to read and were supplied with books, acquired habits of enlightened industry and learned the various trades of civilized workers. The Jesuits were expelled in 1769 by act of the king of Spain, and their work was undone to a very great extent, many of the people lapsing into barbarism. In 1776 Paraguay was acquired by Buenos Aires.

COMPARATIVE AREAS

Washington and Oregon together are nearly as large as Paraguay. The Canadian province of Alberta is over 80,000 square miles larger.

Independence was secured in 1811. The Presidency of the new republic fell to Dr. Francia, who ruled with a rod of iron until 1840. On his death in that year, his nephew, Antonio Lopez, succeeded, and carried on the same despotism until his death, in 1862. Then a third member of this family, F. Solano Lopez, wrought the final tragedy of his people. He waged a hopeless war with Brazil, Argentina and Uruguay for five years (1865-1870), impressing into service even the aged and infirm, and forming whole regiments of boys of twelve to fifteen years. In his final retreat he destroyed, so far as possible, all the property of his own people. This misguided ruler and his last remaining force of 470 men were slain in the swamps of Aquidaban in 1870, and peace came at last to a ruined land. It was practically a land without men. Out of a population of 1,337,439, enumerated just before the war, only 28,746 adult males were left, with 106,254 women and 86,079 children.

A new constitution was adopted in 1870, and after six years the Brazilians withdrew their forces. Financial reforms, for the adjustment of the huge debt, began in 1895. From 1906 there has been progress in railway building. The unit of money is the silver *peso* (equivalent to $0.972 in U. S. money), which is equal to 100 centavos. H.M.S.

Consult Grubb's *An Unknown People of An Unknown Land;* Macdonald's *Picturesque Paraguay.*

PARAGUAY, a river in South America, important commercially because it flows through the most productive temperate region of the continent. It is the largest tributary of the Parana, which unites with the Uruguay to form the Plata (see PLATA, RIO DE LA). Rising in the plateau of Western Brazil, the Paraguay flows in a general southerly direction for 1,500 miles. Its longest tributaries are the Pilcomayo and the Vermejo. Including the Plata and lower Parana, it is part of a water system about 2,500 miles long, and is navigable to within nearly 300 miles of its source, where falls and rapids make boat travel impossible. Asuncion, the capital of Paraguay, and a flourishing commercial port, is situated on its banks; first-class vessels ply between this city and Buenos Aires, the capital of Argentina.

PARAGUAY TEA, the popular name given to MATÉ (which see).

PARALLAX, *pair'a lax.* We never see the sun, moon or stars in their exact position in the heavens, because of our position on the earth when observing them. Astronomers use the term *parallax* to denote this apparent change in position, due to the change of position of the observer. This is illustrated in a simple way in Fig. 1. The post *p* is directly in front of the house, but when viewed from *a* it is in line with the corner *a'*, and when viewed from *b* it is in line with *b'*; that is, as the observer

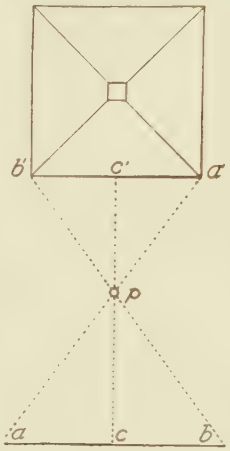


FIG. 1

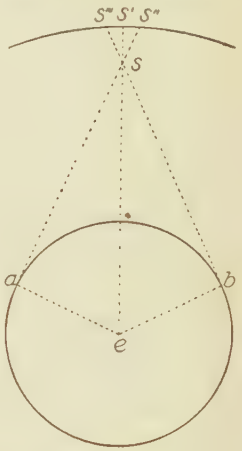


FIG. 2

ILLUSTRATION OF PARALLAX

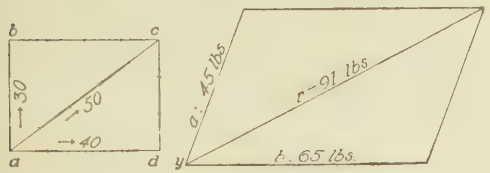
Explanation of figures appears in the accompanying text.

moves from *a* to *b* the post seems to move from *a'* to *b'*. When viewed from *c* the post appears in its true position in reference to the house. The angle *a p c* is the angle of parallax when the observer is at *a*, and the angle *b p c* is the angle of parallax from *b*. As the observer approaches *c* this angle becomes smaller and smaller until, when he is standing at *c*, it disappears.

Fig. 2 shows how astronomers determine the parallax of the heavenly bodies. For the purpose of accuracy all observations of the position of the nearest heavenly bodies are referred to the center of the earth *e*, which corresponds in its position in the diagram to *p* in Fig. 1. The star *s*, could it be viewed from *e*, would appear in the sky as at *s'*, its true position. When viewed from *a* it appears at *s''*; viewed from *b* it appears at *s'''*. The angles of parallax are *a s e* and *b s e*. Since the length of the line *a e* is known, by the use of trigonometry (which see) the size of the angle at *s* can be found, and the length of the line *a s*, which gives the distance of the star from the earth, can be determined. Computing parallax is a very difficult matter and the most accurate instruments are required.

PARALLELOGRAM, *pair a lel' o gram.* See QUADRILATERAL.

PARALLELOGRAM OF FORCES, a mechanical principle discovered by Newton, stated as follows: "If two forces act on a point and if lines be drawn from that point representing the forces in magnitude and direction, and a



PARALLELOGRAM OF FORCES

A force of 30 pounds acting at *a* towards *b* and a force of 40 pounds acting at *a* in the direction of *d* is equal to a single force of 50 pounds in the direction of *c*. The same rule applies when the two forces do not act at right angles, as in the oblique figure. In that diagram *a* and *b* are two forces acting with a force of 45 and 65 pounds, respectively. The resultant is a single force of 91 pounds.

parallelogram be constructed on these lines as sides, their resultant will be represented in magnitude and direction by that diagonal which passes through the point." Although the resolution of two forces acting at right angles is the most common, in which case the parallelogram is a rectangle, the principle holds equally for oblique forces. See COMPOSITION OF FORCES.

PARALYSIS, *pa ral' i sis,* or loss of the power of voluntary movement, is in most cases the result of some disorder of the nervous system, as muscular movements are produced by the stimulation of certain nerve cells. The seat of disorder may be the brain or the spinal cord. Many cases of paralysis are due to the brain disease known as apoplexy, a full discussion of which is given in these volumes under the heading APOPLEXY. Inasmuch as the motor areas (those controlling movement) of each side of the brain correspond with muscular groups upon the opposite side of the body, trouble in the right side of the brain causes paralysis on the left side of the body, and vice versa. Injuries to the skull and abscess and tumor of the brain are other causes of paralysis. In case of injury to the spinal cord the patient ceases to have the power of movement below the point of injury. There are certain diseases of the cord, notably infantile paralysis and spinal meningitis, that cause loss of muscular movement. In some instances, though these are the exceptions, paralysis is a symptom of disease of the affected muscle.

Treatment of paralysis is determined by the nature of the disease or injury causing it. Exercises, massage, electrical treatments and use of splints or other apparatus are among the measures employed by modern physicians to help paralytics recover the use of affected muscles.

Paralysis is derived from a Greek word meaning *to disable the side.* The term *paresis* is applied to a condition of partial paralysis.

Related Subjects. The reader is referred to the following articles in these volumes

Apoplexy	Meningitis
Infantile Paralysis	Nervous System

PARAMARIBO, *pair a mair' a bo,* the capital of Dutch Guiana and the center of the trade of the colony. It is situated on the right bank of the Surinam River, about sixteen miles from its mouth. The city is well built, and is made attractive by modern dwelling houses and rows of orange trees along its streets. Fort Zeelandia, the residence of the governor, and Fort Amsterdam protect the large harbor. Sugar, rum, molasses and rubber are extensively exported. Population in 1920, 50,560. See DUTCH GUIANA.

PARANA, *pah rah nah',* one of the most important rivers of the world, and next to the Amazon, the largest in South America. It is formed in the southern part of Brazil by the uniting of the Rio Grande and the Paranahyba, and flows in a general southerly direction through Brazil, between that country and Paraguay, and between Paraguay and Argentina, then through Argentina until it finds an outlet into the Atlantic Ocean, through the estuary of the Plata (see PLATA, RIO DE LA). Near Corrientes, on the boundary between Paraguay and Argentina, it is joined by its largest tributary, the Paraguay River (which see). At the head of the Plata estuary it is joined by the Uruguay. The total length of the river, from the confluence of the Rio Grande and the Paranahyba to the ocean, is 2,500 miles; excluding the Plata, it is 2,270 miles. It has a drainage basin nearly equal to that of the Mississippi, and it is about the length of that stream, excluding the Missouri.

Below its confluence with the Paraguay, the Parana traverses the level pampas of Argentina, and for a distance of a thousand miles is navigable for large river vessels. Ocean-going steamers sail through the Plata estuary and up the stream as far as Rosario, Argentina, 400 miles from the Atlantic. In its lower course the Parana divides into numerous channels, some of which are two miles in width. Above its confluence with the Paraguay are several

cascades and rapids, including the magnificent Victoria Falls of the Iguazu. See map, South America.

PARASITE, *pair'a site,* a plant or animal that lives upon or within the body of another plant or animal called the *host,* from which it derives its nourishment. Examples are fleas, ticks and plant lice. Those parasites which live upon the body of the host are called *external,* and those which live within the body, *internal,* parasites. The parasites mentioned above and many others are large enough to be seen without the aid of a magnifying glass, but there are many others so small that it requires a powerful microscope to reveal their structure. Some of these tiny creatures are "fearfully and wonderfully made," and could they grow to the size of a dog or a sheep they would be more hideous than were the monsters whose fossils are found in the rocks of a past geologic age. The smallest of the aphides are good examples of this sort of parasite. Others, such as fungi and the San José scale, are of simpler structure.

Parasites are always injurious to the host, since they take from its body more or less nourishment. In some instances only one or more organs are directly injured, but in most cases the entire body of the host is so drained of its nourishment that growth is prevented and death sometimes results. Such parasites as aphides, phylloxera, the San José scale and the potato scab are among the farmers' and fruit-growers' most dreaded pests. The various forms of rust, smut and mildew are also very injurious.

Tapeworm, trichina and smut on corn are good examples of internal parasites. Mistletoe, which infests forest trees in the southwestern part of the United States, and dodder, found on clover and alfalfa, are among the largest vegetable parasites in the temperate regions. In tropical forests are found many parasites which grow to large size and kill the trees upon which they live.

Consult Braun's *Animal Parasites of Man;* Fantham's *Some Minute Animal Parasites.*

Related Subjects. The following articles connected with this topic are treated in these volumes:

Aphides
Bacteria
Disease, subtitle *Diseases of Plants*
Dodder
Flea
Fungi
Louse
Mildew
Mistletoe
Phylloxera
Rusts
San Jose Scale
Smuts
Tapeworm
Ticks
Trichina
Yeast

PARASITIC, *pair a sit'ik,* **DISEASES** are diseases caused by parasites (which see). They may attack plants, animals or human beings. For a full discussion of the subject see the articles Bacteria and Bacteriology; Disease, and lists of related subjects.

PARCEL POST. In recent years the leading nations of the world have sought new ways in which to realize for the people additional benefits from their postal system. In no direction have they met with greater success than through the transportation of packages by mail, a business which has come to be known throughout the world as the parcel post.

In the United States. Prior to the year 1913 it was permissible to ship merchandise by mail, but the weight of the package was limited to four pounds and the price charged was high—sixteen cents a pound. What the people needed was a means of sending merchandise of the most varied description, in parcel lots, with a weight limit much greater than the old regulations allowed, and at far lower rates.

As the experience of other nations had shown that such requirements were not unreasonable, Congress passed a bill, August 24, 1912, the same to become effective January 1, 1913, authorizing the Postmaster-General to work out the details necessary to establish a parcel post system, at the same time giving him the right to make modifications of regulations in the future, as to weight, rates, classification, etc.

According to the regulations in force May 1, 1918, packages containing merchandise of the most varied description—all forms of factory, farm and dairy products, such as butter, cheese, eggs, meats and vegetables, and articles of all kinds, are admitted to the mails, provided they are properly packed, and do not fall under the heading of unmailable articles, such as explosives. A collect-on-delivery plan has also been added, so the government not only carries the package, but it collects the money due for the same and remits it to the shipper. For a small additional fee insurance against loss can be purchased, or the package can be registered, or if time is an object the shipper can have the benefit of special delivery.

A package weighing seventy pounds can be sent any distance up to and including a distance of 300 miles from the sending office; a package weighing fifty pounds may be sent any distance within the United States, one of eleven pounds to most of the leading nations of the world. But the limit of weight has been changed several times, and doubtless further changes

will be made. To guard against unwieldy packages, it is required that the same must not be more than seventy-two inches in length and girth combined.

The method of determining the amount of postage required is one of the most interesting features of the system. It seems impossible for the United States to adopt a "flat" rate, that is to say, to estimate the postage according to weight only, and charge the same for all distances, as in all other mail matter. Manifestly charges must be estimated according to weight and distance, and this necessitated the adoption of a zone system. A carefully prepared map of the United States is divided by crosslines into quadrangular areas, one-half of one degree in length and breadth (about thirty miles square), called units of area. These units are numbered in regular succession, beginning with number 1 in Porto Rico and ending with number 5,803 in the state of Washington. But since the location of a number of these units falls in the Great Lakes, the Gulf of Mexico, the oceans and some in Canada, there are only 3,500 numbered squares in the land area of the United States.

Each of this latter number of units becomes the center of a system of zones, formed by drawing seven concentric circles (that is, circles with a common center but with varying diameters), whose radii are 50, 150, 300, 600, 1,000, 1,400 and 1,800 miles respectively, thus dividing the United States, with respect to each unit, into seven zones. The eighth zone includes all units outside of the seventh zone. The rates of postage vary according to the zone in which the delivery office is situated in respect to the sending office. A moment's reflection shows that only those offices located in the same unit can have the same system of zones; therefore it is necessary to prepare 3,500 different maps to serve the needs of all the post offices in the United States, and to give them their correct parcel post regulations.

This is not as complicated as it appears to be. As a matter of fact, a very little study enables a postmaster to determine offhand the zone in which is located any office named in respect to his office. If he does not know, by referring to the parcel post guide which his office possesses, he can see the number of the unit in which the office is situated, then by examining the map made for his office he readily sees the number of the zone. The following table, then, enables him to estimate the amount of postage required:

Weight	Local Zone	First and Second Zones	Third Zone	Fourth Zone	Fifth Zone	Sixth Zone	Seventh Zone	Eighth Zone
1 lb.	$0.05	$0.05	$0.06	$0.07	$0.08	$0.09	$0.11	$0.12
2 lbs.	.06	.06	.08	.11	.14	.17	.21	.24
3 lbs.	.06	.07	.10	.15	.20	.25	.31	.36
4 lbs.	.07	.08	.12	.19	.26	.33	.41	.48
5 lbs.	.07	.09	.14	.23	.32	.41	.51	.60
6 lbs.	.08	.10	.16	.27	.38	.49	.61	.72
7 lbs.	.08	.11	.18	.31	.44	.57	.71	.84
8 lbs.	.09	.12	.20	.35	.50	.65	.81	.96
9 lbs.	.09	.13	.22	.39	.56	.73	.91	1.08
10 lbs.	.10	.14	.24	.43	.62	.81	1.01	1.20
11 lbs.	.10	.15	.26	.47	.68	.89	1.11	1.32
12 lbs.	.11	.16	.28	.51	.74	.97	1.21	1.44
13 lbs.	.11	.17	.30	.55	.80	1.05	1.31	1.56
14 lbs.	.12	.18	.32	.59	.86	1.13	1.41	1.68
15 lbs.	.12	.19	.34	.63	.92	1.21	1.51	1.80
16 lbs.	.13	.20	.36	.67	.98	1.29	1.61	1.92
17 lbs.	.13	.21	.38	.71	1.04	1.37	1.71	2.04
18 lbs.	.14	.22	.40	.75	1.10	1.45	1.81	2.16
19 lbs.	.14	.23	.42	.79	1.16	1.53	1.91	2.28
20 lbs.	.15	.24	.44	.83	1.22	1.61	2.01	2.40

For parcels above 20 pounds, in the first two zones, the rate increases in the same proportion until the 70-pound limit is reached.

In Canada. At present, the Canadian parcel post system is in a stage of development. In domestic service merchandise can be sent through the mails, but the weight limit is only five pounds, and the rate is high, from five cents to twenty-two cents per pound. It is a flat rate, the same for any distance in Canada. However, packages of eleven pounds weight may be sent from Canada to most of the countries of the world, though not as yet to the United States. Canadians can only send to or receive from the United States packages weighing not more than seventy ounces. The rates of postage to a foreign country depend on distance sent and the country to which a parcel is sent. Preference is shown to the United Kingdom and its dependencies.

In Great Britain. This country established a parcel post system in 1883, and statistics show that it has grown steadily in popular favor. The limit of weight is eleven pounds, the dimension of the package must not exceed seventy-two inches in length and girth combined. The postage is a flat rate, six cents on the first pound and increasing according to weight.

Continental Europe. Most of the nations of Europe have parcel post systems. The limits of weight are as follows: Italy, eleven pounds; France, twenty-two pounds; Austria, Germany and Switzerland, each 110 pounds; Belgium 132 pounds. Some countries have no limit as to size, but charge extra for unwieldy packages. Germany and Austria have the zone system for estimating charges, the others have a flat rate. In general, the international business conducted

by using the parcel post has grown to enormous proportions. Figures collected at Berne, Switzerland, in 1904 for use of the Postal Union showed that parcels mailed across the frontiers of thirty-six nations and colonies numbered about 38,000,000 annually. The volume of domestic business of the nations concerned made possible by parcel post was even greater. F.ST.A.

PARCH'MENT, material made from the skins of sheep, goats and other animals, used principally as writing material. The finer grades, called *vellum,* are made from the skins of calves, kids and stillborn lambs. Parchment is prepared by removing the wool or hair from the skin, placing the latter in lime to discharge the fat, then stretching it upon a frame and dressing it with knives and scrapers. Pulverized chalk is rubbed on with pumice stone, to smooth and soften the skin and to obtain a uniform thickness. The heavier parchment used for drumheads is made from the skins of asses, older calves, wolves and goats. The finer grade is used for important writings, such as charters, university diplomas, wills, etc.

Parchment paper, or vegetable parchment, first manufactured in 1857, is used for legal documents, maps, etc., and for connecting laboratory apparatus. This is made by dipping pure, unsized paper into a cooled mixture which consists of two parts of sulphuric acid to one part of water, then washing to remove the acid, and finally drying under pressure.

PARDON, in law, is the remitting, in whole or in part, of punishment imposed for the commission of a crime. The power of pardoning offenses against the United States is vested by the Constitution in the President and extends to all cases except those of impeachment of United States officers. The power of pardon in the various states usually rests with the governor, but a few states require the sanction of one branch of the legislature, and some have a state board of pardons, of which the governor, *ex officio,* is a member, and to which applications for pardon must be made.

Pardons consist of three classes, *absolute, conditional* and *general.* An *absolute* pardon frees the person without any condition; a *conditional* pardon is one in which certain conditions must be complied with; a *general* pardon applies to a group of offenders guilty of the same offense. *Commutation of sentence* lessens the term of punishment, while a *reprieve* is a suspension of a death sentence for a specified time which results in delay of execution. Since the laws of the different states vary in detail, one interested in the subject should consult the laws of his state. See PAROLE.

Canada. In Canada pardons are granted by the Crown, which means by the Governor-General in Council. A commutation of sentence is also granted by the same authority. A reprieve may be granted by the judge of the court before whom the trial was held or by any other judge qualified to sit in that court, provided the Governor-General believes royal mercy should be extended, or that some point of law relating to the conviction has not been decided.

PARENT AND CHILD. Between the present day and the time of the early Romans, when a father had power of life and death not only over his own children but over his grandchildren as well, there has been a revolution in public sentiment regarding children. To-day the welfare of a child is considered equal or superior in importance to the legal rights of others to control him. Some of this change in thought came early enough to be expressed in English common law, which is followed both in the United States and Canada, but part of it is embodied only in statutes, which differ in each state and province.

Parents' Duties and Responsibilities. The father of children, or the mother, if she is the legal head of the family, must support them and educate them. The head of the family may correct them and punish them when necessary, but for cruelty he is liable to prosecution for assault. Under many statutes the state may take a child out of the possession of its parents for its own protection. In general, a parent is responsible for debts contracted or damage done by his child, but he is not responsible for the child's acts. In some instances a will which makes no provision for children is void.

Teachers' Duties and Responsibilities. Any person who temporarily or permanently assumes a parent's duties is considered at law to be *in loco parentis,* that is, *in place of the parent.* Thus a teacher may discipline a child, but must not indulge in cruelty. A public school teacher cannot compel a pupil to study any subject against the wishes of its parents, nor punish it for obeying its parents, but the child may be excluded from the school. School authorities may expel pupils for breaches of discipline, general immoral character or refusal to do prescribed work. In some states the courts have held expulsion to be legal when the parent offends in one of several ways: for

example, by refusing to correct or permit the correction of a child; by refusing to sign and return reports of standing, or by using abusive language to a teacher in the presence of the pupils.

Consult Bonner's *Common Law of Husband and Wife and Parent and Child;* Eversley's *Law of Domestic Relations.*

Related Subjects. The above article treats the subject from the legal side only. Other aspects of the subject of the rights of children will be found in the following articles:

Baby	Children, Societies for
Child	Children's Bureau
Child Labor	Child Study

PARENT-TEACHER ASSOCIATION. As a universal auxiliary of the public school the Parent-Teacher Association was inaugurated by the National Congress of Mothers and Parent-Teacher Associations (see that article). As a means by which the largest number of parents could be reached no better plan could have been devised. It doubled the educational possibilities of the school system by using the schools as meeting places for parents as well as children, by encouraging and suggesting educational helps in child nurture and home making. It lightened the burden of the educators by bringing the parents into acquaintance with teachers, thereby securing mutual sympathy and intelligent coöperation in school work. It increased the interest in the schools, as parents came closer into touch with their needs and purposes, and, incidentally, it has been the means of securing many important improvements in schools. The organization of parent-teacher associations was begun and continued by the National Congress of Mothers and Parent-Teacher Associations, but owing to the fact that many did not understand that the parent-teacher associations were branches of the Congress of Mothers, it was voted that the name be included in the title, and this was legally done, and the organization was reincorporated in perpetuity. There never were two organizations, as some suppose.

State branches of the Congress were established, and they were authorized to carry out the objects of the National Congress of Mothers and Parent-Teacher Associations. County organizations were formed, made up of the local Parent-Teacher Associations, mothers' circles, and child-welfare circles, which bear the same relations to the stimulation of parental interest and education that the teachers' institute bears to teachers. Coöperation of school superintendents was secured, and educational leaders of broad vision welcomed and promoted the movement.

There are three reasons why parent-teacher associations should be generally established:

1. To give fathers and mothers opportunity to study how to develop the highest physical, mental and moral possibilities of their children through study of child nurture and home making.
2. To learn what the school is doing and give intelligent aid to teachers, thus lightening their burden and promoting the welfare of the children.
3. To learn conditions affecting the children outside of home and school, and by united effort awaken the community to its responsibility to the children.

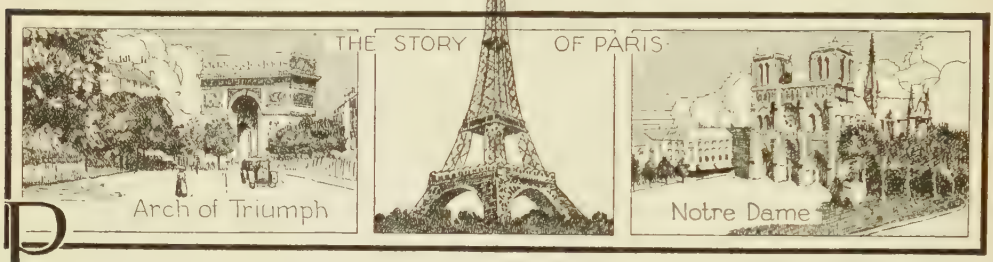
The most successful parent-teacher associations confine themselves to these lines of work, avoiding political or other topics on which opinions differ widely. The parent-teacher association should not be used to promote political preferment or to interfere with school authority. The Bureau of Education and National Congress of Mothers and Parent-Teacher Associations are coöperating in educational guidance for parent-teacher associations. Reading courses for parents, the assistance of libraries in supplying books, program help and reading courses for boys and girls are available without cost.

The most valuable result of the parent-teacher association cannot be measured, because it is not possible to measure wiser fatherhood and motherhood achieved through child study. Some of the material benefits secured by parent-teacher associations in various places are the following:

Provision of shower baths for boys; victrolas in schools; heating and ventilating plants; electric clocks installed; pictures and pianos for schools; better protection from fire; schoolrooms furnished; playgrounds equipped; moving-picture machines installed; social centers established; coöperative investigation to improve curriculum; sewing classes conducted to teach girls to make their own clothes; rest rooms furnished; milk provided for children not properly nourished; drinking fountains to replace open pails in school houses; warning signs to motorists placed at approaches to schools; state loan funds established for education of boys; lessons given to school children on table manners; layettes furnished to expectant mothers; child-welfare exhibits; streets graded and paved from school buildings to business districts; physical culture classes for mothers conducted; kindergartens built and equipped; establishing rooms for anaemic children where correct feeding has been remarkably successful in developing the children; all-night summer camp for mothers and babies in a park; medical inspection secured; flagpoles for school yards; clean-up weeks; kindergartens established and thousands of babies saved through education of mothers in infant hygiene. H.K.S.

See National Congress of Mothers and Parent-Teacher Associations.

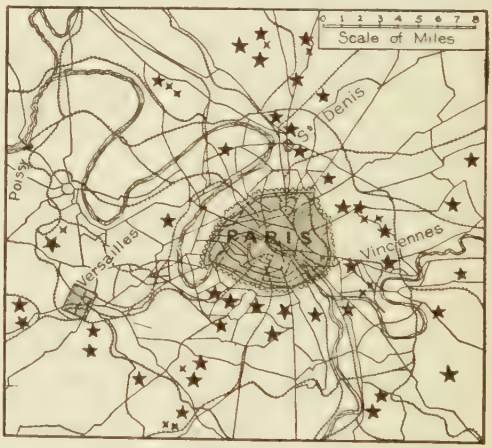
PARHELION, *pahr he'li on,* a false sun, appearing much like the sun, and seen apparently near the edge of the real sun. Parhelia (the plural of parhelion) are due to modifications which light undergoes when it falls on crystals of ice, raindrops or the minute particles that constitute clouds; in other words, they are due to the presence of ice crystals in the air. Parhelia may be double, triple or even more numerous, and are always connected with one another by a white halo or circle. See Corona; Halo.



PARIS, *pair'is,* the capital and metropolis of the French republic, next to London the largest city in Europe, and the third city in the world, is situated in Northern France, on both banks of the River Seine. It is 285 miles southeast of London, by way of Dover and Calais, and lies in the center of a level plain which the Seine crosses from southeast to northwest. By reputation Paris is the world's "city of pleasure." The very name suggests at once a place bubbling over with the joy of life—"the cradle of the freshest thought, the newest fashion and the latest luxury; the paradise of pleasure seekers; the most attractive jewel that glitters in the coronet of Mother Earth." So writes an enthusiast.

Such a characterization of the metropolis of the French people is not unjust or exaggerated in ordinary times, but during the dark days of the War of the Nations, when the city was threatened with siege and bombardment, Paris showed itself to be a sober, earnest community of people who weighed at its true value the crisis which they faced. The city in peace times, too, is much more than a rendezvous for those who seek the latest styles in dress, even though it does take first rank as a center of fashion. It is a center of finance and commerce, and of education, art, literature and music; it is one of the most beautiful and artistic municipalities of the world, and also is one of the world's greatest fortresses. Encircling it is a wall with fifty-seven gates and nearly one hundred bastions, and within two miles of the city there are seventeen forts. Outlying fortresses to the number of nineteen surround an area of 400 square miles. The wall encloses an area of about thirty square miles.

Outside the wall, to the west, is the great pleasure ground of the people—the magnificent Bois de Boulogne—covering nearly 3,000 acres. Great trees shade the hillsides, meadows, lakes and gardens, and the park has a bird pavilion and aquarium that are famous. This beautiful recreation ground adjoins the suburb of Boulogne, one of the numerous interesting towns about the capital; with these outlying suburbs



PARIS AND ITS PROTECTING FORTS

Strong as these fortresses are, they were built in a day before the construction of such guns as the Germans possessed at the outbreak of the War of the Nations in 1914, and could not have withstood a long bombardment. The German army forced its way within forty miles of Paris in August, 1914.

Paris is connected with a great network of railroad and electric lines. Six lines of railway pass through the city wall. See Fontainebleau; Saint Denis; Sevres; Versailles.

General Description. A distinctive feature of the general plan of Paris is the system of

boulevards. The greater part of the oldest section of the city is encircled by what are known as the *Grands Boulevards,* built upon the ramparts constructed in the fourteenth, sixteenth and seventeenth centuries. Beyond the Grands Boulevards are the old suburbs, and these in turn are enclosed by another circle of boulevards, coinciding with the ramparts of the eighteenth century. Outside of the latter are the newer suburbs (made a part of the city after 1860), which extend to the boulevards lining the modern fortifications. The suburbs on the north, east and south are the homes of working people, and those on the west contain the residences of the well-to-do. There are other wide and beautiful avenues traversing the city at angles with the line of boulevards, many of these being designated as *Rue,* the French word for *street.* These attractive thoroughfares, spacious and beautifully clean, are lined with trees and seats, and on the sidewalks are small tables where rich and poor alike may gather for conversation and refreshment. There are miles of cafes, shops and amusement places, and by day and night on the principal avenues one may see life in its most vivacious aspects.

The visitor in Paris is always impressed by the harmony of its architectural plan. The sky line presents no such contrasts as does that of Chicago or New York, for instance, for the buildings of Paris have been erected in accordance with laws designed to produce an effect of artistic unity. In the French capital, therefore, one never sees such incongruities as a huge, modern skyscraper beside an old, weatherworn building three or four stories high. Light-colored limestone, which lends itself so readily to graceful ornamentation, has been quite generally used in the construction of both private residences and public buildings.

Public Squares, Parks and Gardens. The open squares of Paris, numbering more than 130, are world famous. In the heart of the city, on the north bank of the Seine, is the celebrated Place de la Concorde ("Place of Peace"), on the site of which Louis XVI and Marie Antoinette were guillotined during the French Revolution. In the center of the square, where once the death machine ceaselessly devoured its victims, there now stands the noble obelisk which centuries ago guarded the gateway to the Temple of Luxor, in Egypt (see Obelisk). Around the square are eight colossal figures symbolizing former provincial capitals, including Strassburg, in Alsace. As a perpetual emblem of the grief of the French people over the loss of their province, the Strassburg statue is kept decorated with crape-covered flags and wreaths.

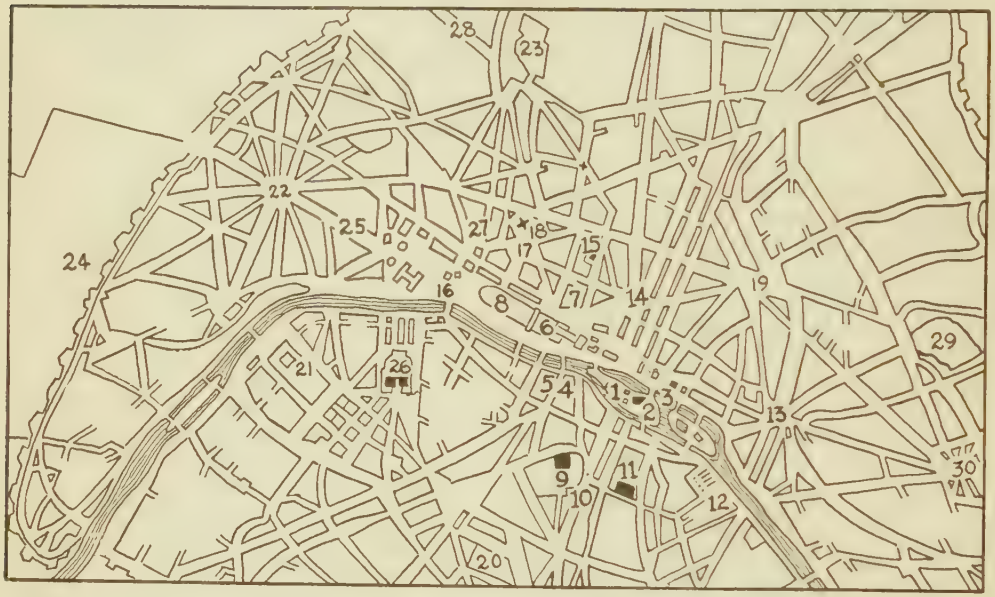
Leading westward from the Place de la Concorde is one of the finest boulevards in the world—the Champs Elysées (which see). This fashionable thoroughfare connects the "Place of Peace" with another famous square, the Place de l' Etoile ("Place of the Star"). From the latter twelve broad avenues radiate in all directions, the Champs Elysées being continued on the opposite side as the Avenue de la Grande Armée. In the center of the square is a colossal Arch of Triumph erected in commemoration of the victories of Napoleon (see article, page 329). A few blocks east of the Place de la Concorde is the Place Vendôme, having as its most conspicuous ornament Napoleon's Column of Victory, which is decorated with bas-reliefs illustrating scenes from the campaign of 1805. Another well-known square in the vicinity of the Place de la Concorde is the Place Carrousel, containing another of Napoleon's great triumphal arches. The Place de la Bastille, on the site of the famous state prison (see Bastille), the Place de la République, with an imposing bronze statue symbolizing the Republic, the Place de Rivoli, containing a famous equestrian statue of Joan of Arc, the Place de la Nation and Place Saint Michel are other handsome squares.

Of the many attractive garden spots in the city none is of greater historic interest than the Jardin des Tuileries, adjoining the Place de la Concorde on the east. The famous royal palace (see Tuileries) was destroyed in 1871 by the Communists, but the grounds have been converted into a beautiful public park which the children use as a playground and their elders as a recreation spot and promenade. The garden is bordered on one side by a fine broad avenue, the Rue de Rivoli, and on the other by the swiftly flowing Seine; from its terrace along the bank of the river a magnificent view of the city may be obtained.

Across the river to the south are the Gardens of the Luxembourg, with their beautiful Observatory Walk and wonderful conservatories. On this side of the river, too, are the spacious grounds of the Hôtel des Invalides (the home for old soldiers), the Jardin des Plantes, with a famous collection of plants from all parts of the world, and the Champ de Mars (Field of Mars), containing the Eiffel Tower (which see). From this loftiest structure in the world a single flag floated after America's entrance into the

War of the Nations—the Stars and Stripes. Other lovely park areas are the Buttes-Chaumont in the northeastern part of the city, with many picturesque hills and ravines; the grounds of the Palace of the Trocadéro, on the north bank of the Seine, and Monceau Park, in one of the most aristocratic sections. Most of these squares and gardens are located in the accompanying map.

Notable Buildings. The first public building in point of interest is the Louvre, notable for its architectural beauty and its priceless art



POINTS OF INTEREST IN PARIS

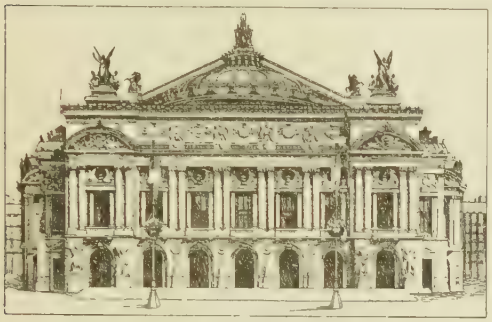
(1) Ile de la Cité
(2) Notre Dame
(3) Hôtel de Ville
(4) Institute
(5) L'École des Beaux Arts
(6) Louvre
(7) Palais Royal
(8) Tuileries
(9) Palais de Luxembourg
(10) Boulevard St. Michel
(11) Panthéon
(12) Jardin des Plantes
(13) Place de la Bastille
(14) Halles Centrales
(15) Bourse
(16) Place de la Concorde
(17) Place Vendôme
(18) Grand Opera House
(19) Place de la République
(20) Montparnasse
(21) Eiffel Tower
(22) Arch of Triumph
(23) Montmartre Cemetery
(24) Bois de Boulogne
(25) Champs Elysées
(26) Hôtel des Invalides
(27) Madeleine
(28) Avenue de Clichy
(29) Père Lachaise Cemetery
(30) Place de la Nation

treasures (see LOUVRE). It extends along the Seine for about a mile and adjoins the Garden of the Tuileries on the east. Originally the Louvre was connected with the royal palace destroyed in 1871. North of it is the Palais Royal (which see), built by Cardinal Richelieu about 1630, and now the headquarters of the Council of State and of the French Theater. The Bourse, or Exchange, an artistic building adorned with sixty-six Corinthian columns, is north of the Palais Royal. A few blocks east of the Louvre is one of the most magnificent structures in the city—the Hôtel de Ville, built in French Renaissance style. It contains the offices where the municipal business of the city is transacted. In the same vicinity, on an island in the Seine known as Ile de la Cité, is the great Palais de Justice, the headquarters of the law courts and police department. This structure contains the old Conciergerie, the prison in which Marie Antoinette and Robespierre were confined during the Revolution.

The Palace of the Trocadéro, in the park mentioned previously, is a huge Oriental building in the form of a crescent, erected in 1878 for the International Exposition. Northwest of the Place de la Concorde are the Palais de l'Elysée, the residence of the French President, and the two Palais des Beaux Arts (Palaces of the Fine Arts), in which the annual Paris Salons are held (see SALON, THE PARIS). The executive mansion is on one side and the two art buildings on the other side of a little park forming the lower end of the Champs Elysées. On the south side of the Seine, in a direct line with the Louvre, is the beautiful Luxembourg Palace, the building in which the French Senate holds its sessions. The lower house of the Na-

tional Assembly, the Chamber of Deputies, has its sittings in the Palais Bourbon, on the south side of the Seine opposite the Place de la Concorde. Of many fine theater buildings the largest is the Grand Opera House, occupying an area of nearly three acres.

The largest and finest of the religious buildings of Paris is the Cathedral of Notre Dame, built during the twelfth and thirteenth centuries and restored between 1846 and 1879 (see NOTRE DAME, CATHEDRAL OF, for illustration).



THE GRAND OPERA HOUSE

It covers an area of nearly three acres; the ground alone cost over $2,000,000 in 1870, and almost $8,000,000 were expended in its construction, the building being completed in 1874. Sweden, Finland, Italy and Spain, as well as France, contributed building material.

The Church of Madeleine is in the style of a Greek temple, and is surrounded on all sides with a line of Corinthian columns. The interior is walled and paved with marble, with decorations in gold and other rich colors. Through the stained-glass windows of the dome marvelous lights shine on polished columns, wonderful pieces of sculpture, fresco and painting. The Panthéon was originally consecrated by the Convention of 1741 as a temple to illustrious men of the nation, but since has been restored to Christian worship. It has the form of a Greek cross. The frescoes of the interior, depicting scenes in the life of Sainte Geneviève, the patron saint of Paris, are very fine. In the crypt are the tombs of Voltaire, Rousseau and Victor Hugo. The Church of Sacre Coeur (Sacred Heart) was erected on Montmartre, the highest point of Paris, in 1874-1891. Chief among the older churches of the city are the Sainte-Chapelle (1245-1248); Saint Severin, situated in the Latin Quarter; and Saint-Germain des-Près, which was completed in 1163.

Museums and Educational Institutions. The richest art treasures of the city are housed in the Louvre. In the Museum of the Luxembourg, adjoining the palace of that name, are

Research Questions on Paris

(An Outline suitable for Paris will be found with the article "City.")

What was the Tuileries? When and by whom was it built, what part did it play in history, and when and by whom was it destroyed?

What and where is the tallest structure in the world? What surmounted it during the spring of 1917?

What are the *arrondissements?* What part do they have in the government of Paris?

What was the Bastille, and why is its destruction celebrated as a national holiday in France? What was done with the key?

What tragic historic event took place in the "Place of Peace?"

What monument shows the enduring grief of France over the loss of Alsace?

How many bridges cross the Seine within the limits of Paris?

How many cities of Europe are larger than Paris? How many in the world? (See article CITY.)

What cities would you pass through in going from London to Paris by the usual route?

Describe the fortifications of the city.

If you were visiting Paris and wanted to see an excellent collection of birds and fish, where would you go? Where would you look for the finest collection of plants?

Who built the palace of Versailles, and what interesting historical events took place in it?

For what is Fontainebleau famous? Sevres?

How was the course of the Grand Boulevards about Paris determined?

What would you see on the sidewalks of Paris that you would never look for on the sidewalks of any American city?

What is the French word for *street?* For *star?* For *peace?*

How does the "sky line" of Paris differ from those of most large American cities?

What object may you see in Paris which a century ago might have been seen in Egypt?

What memorials are there to Napoleon?

Mention some of the chief art treasures of the Louvre.

What is the Paris Salon, and where is it held?

When was the largest and finest religious building of the city constructed? Of what style of architecture is it typical?

Who is the patron saint of Paris? In what structure are frescoes illustrating her life to be seen?

What famous men are buried in this building?

How do the art treasures in the Luxembourg differ from those of the Louvre? When are they transferred from the former to the latter?

What does *Jardin des Plantes* mean? What does *Sacre Coeur* mean?

From whom did the city of Paris take its name?

To whom does it owe its fine boulevard system?

What fate threatened the city during the War of the Nations, and how was it saved?

kept the works of living painters and sculptors. These collections are the property of the state, and the finest works are transferred to the Louvre ten years after the death of the artists. The Cluny Museum, occupying the ancient mansion of the abbots of Cluny, the Carnavalet Museum, the Petit Palais des Beaux Arts and the Trocadéro Palace are other important homes of art collections. The chief educational institution, the University of Paris (see PARIS, UNIVERSITY OF), is one of the oldest and largest in the world, with an annual enrolment of over 17,500 in peace times. The celebrated institution, the Sorbonne (which see), occupies one of the finest college buildings in the world. Other well-known institutions are the College of France, the Polytechnic School, the School of Law, the School of Medicine, the Observatory and the Botanical Garden (Jardin des Plantes). All of these educational institutions are located in what is known as the Latin Quarter. Of the various libraries, the Bibliothèque Nationale (which see) is the largest and most famous.

Transportation and Industry. Local transportation is taken care of by means of electric tramways and horse and motor cabs. In efficiency the cab system of Paris is unsurpassed. The Seine, which is from 300 to 500 feet wide along its course within the city, is spanned by over thirty bridges, many of which are adorned with parkways, statuary and historic relics. All are directly connected with quays which line the river banks; these quays, like the boulevards, are made attractive by trees, and contribute materially to the charm of the city. The six railway systems entering Paris have terminal buildings of massive proportions and palatial beauty.

The French capital has a unique and well-deserved reputation for the high grade of its articles of luxury, such as perfumes, gloves, artificial flowers and jewelry. These are made in small industrial establishments which utilize the finest skill available. The Gobelin tapestries, made in the southern part of the city, have been famous for centuries. In recent years there has been an increase in the number of larger establishments, and the output of these factories is becoming more and more important. Their products include automobiles, machinery, railroad supplies, chemical products, soaps, dyes, leather and other commodities. Distinctive among the features of industrial Paris are the great city markets, the slaughterhouses and the fine large department stores. As a center of trade the French metropolis outranks all other cities of the republic. In normal years the annual output of its industrial establishments (most of which is exported) is valued at more than three billion francs (about $600,000,000).

Government. Paris is divided for governing purposes into twenty *arrondissements,* or districts. The head of the municipal government, called prefect of the Seine, is appointed by the national government. Each arrondissement sends four elected members to a municipal council, and each has its own mayor. This official and his three assistants are appointed by the President. An arrondissement takes care of the assessment and collection of taxes within its own limits, and is a local center for educational and charitable work. The Paris plan of city government is one of the most admirable in the world in its practical effects, and there is in operation a satisfactory plan of civil service appointments. The sewage, water supply and street-cleaning systems are managed with the highest degree of efficiency, as are matters of health and sanitation, charity and education.

History. Julius Caesar, in his *Commentaries,* describes a small collection of huts called Lutetia, on the banks of the Seine. This obscure village, the chief settlement of the Parisii, a Gallic tribe, occupied the site of the magnificent city of to-day. As a Roman colony the settlement spread out on both sides of the river, and the present name began to be applied in the fourth century. Clovis (which see), founder of the Frankish monarchy, made Paris his capital, and in the tenth century it became the headquarters of Hugh Capet (see CAPETIAN DYNASTY) and the seat of government of the French kingdom. During the Middle Ages the city grew steadily, and the kings up to the time of the French Revolution did much to enlarge and beautify it. After the Revolution Napoleon ordered the construction of new buildings, public gardens, arches, bridges and other improvements, and he spent millions of dollars in the restoration and arrangement of art and scientific collections. Napoleon III continued the work of beautifying the city, and to him more than anyone else Paris owes its magnificent system of boulevards. During the period of the Commune (see COMMUNE OF PARIS) many fine buildings were destroyed, but the city was restored to its former splendor within two years. In 1878, 1889 and 1900 Paris was the home of great international exhibitions, that of 1900 attracting 51,000,000 visitors. The

city suffered a terrible siege in the Franco-German War, when the inhabitants were starved into surrender. During the War of the Nations (which see) it was the chief objective of the German invaders; repeatedly it was bombarded by a great gun seventy-six miles distant, but the spirit of its citizens remained undaunted. In 1921 it had a population of 2,906,472.

B.M.W.

Consult Headlam's *France*, in The Making of the Nations Series; Smith's *Twenty Centuries of Paris;* Hessling's *Old Paris: Its Historic Buildings.*

PARIS, a town in Brant County, Ontario. It is on the Grand River and on the Grand Trunk, Lake Erie & Northern and Grand Valley Electric railways. By rail it is thirty miles from Hamilton, fourteen miles from Galt and eight miles from Brantford. Paris is often called the most beautiful town in Ontario. It has a public library, and owns its electric lighting and water systems. Paris is a manufacturing community, its chief products being knitted goods, shirts, hosiery, agricultural machinery and shells. The International Harvester Company employs about 2,000 men and women. Paris was settled in 1850, and was incorporated in the same year. It suffered a heavy loss by fire in 1900. Population in 1911, 4,098; in 1921, 4,368.

PARIS, in Greek legend, the second son of Priam, king of Troy. His mother, having dreamed that he would cause the destruction of the city, decided that he should be left to perish on Mount Ida; but the servant to whom she had intrusted the duty of leaving the child took it home and reared it as his own son, naming it Paris. As he grew to young manhood Paris became famous for his courage and skill in protecting the shepherds from robbers, and they gave him the name of Alexander, which means *man protector.* While on Mount Ida, he was married to the beautiful nymph Oenone. By his award of the Apple of Discord to Venus, he brought upon himself the enmity of Juno and Minerva, who followed him persistently and brought disappointment and misfortune to him and his whole race.

Soon after this unsatisfactory award King Priam proposed to give as a prize to the winner of certain military contests the most beautiful bull in his kingdom. This animal was found in the possession of Paris, and was taken to Troy; and Paris, disliking to lose his treasured bull, entered the contest and distinguished himself by defeating all, even his own brothers. This so angered Hector that that prince would have slain Paris had not Cassandra identified him as the son of Priam, and her own brother. Forgetting the misfortunes that Paris was to bring to his country, Priam adopted him, and shortly afterward sent him on a voyage to Greece, although Cassandra had prophesied that nothing but misfortune would come of the expedition. Here Venus remembered her promise to give him the most beautiful woman on earth as his wife, and sent him to the palace of Menelaus, where he found Helen, and during the absence of her husband, the king, won her affections. Out of this grew the Trojan War. Though Paris distinguished himself in that conflict, he was always treacherous and regarded as more or less effeminate. It was he who killed the heroic Achilles, who had come on the invitation of Priam to the temple of Jupiter to ask for the hand of Polyxena. Paris was wounded by the arrows of Philoctetes and fled to his former wife, Oenone, who had promised to cure him if he was wounded, but she was so angered at his desertion that she refused to aid him, and Paris died in agony. Then Oenone repented and threw herself upon his funeral pyre and was burned.

Related Subjects. The reader is referred to the following articles in these volumes:

Hector	Menelaus
Helen of Troy	Troy

PARIS, *pa ree',* Louis Albert Philippe d'Orleans, Count of (1838-1894), a claimant of the throne of France, and the second titled Frenchman to volunteer service in the cause of America. He was born in Paris, the son of the Duke of Orleans, and grandson of King Louis Philippe. After his father's accidental death in 1842 he became heir apparent to the throne. At the outbreak of the War of Secession in 1861, in company with his brother, the Duc de Chartres, he sailed for America, and following the example of Lafayette in the Revolutionary War, offered his services in America's behalf. He joined the staff of General McClellan of the Federal army, and as a captain of volunteers, served with bravery at the Battle of Gaines's Mill, in 1862. During the latter part of that year he returned to England, and in 1873 resigned his claim to the French throne. The Act of Expulsion, a measure passed in 1886 by the French republicans, forced him to leave France and he afterward lived a retired life in England. In 1890 he revisited the United States. His chief published work is a *History of the Civil War in America.*

PARIS, *pair'is,* Tex., county seat of Lamar County and a railroad center, in the northeastern section of the state. It is near the Oklahoma state line, about ninety-five miles northeast of Dallas. The Texas & Pacific, the Texas Midland, the Saint Louis & San Francisco, the Gulf, Colorado & Santa Fe and the Paris & Mount Pleasant railroads meet here, and the city is the distributing point for a region which produces large quantities of cotton, fruits, vegetables, corn, oats and alfalfa. The industrial establishments include cottonseed-oil mills, a large cotton compress, cotton gins, and box, handle, crate and canning factories. Paris has a Federal building, a granite county courthouse, three hospitals, a Y. M. C. A. building, and a park and summer resort in the eastern suburbs. The city has one of the first municipally-owned abattoirs erected in the United States. The place was settled in 1841. In 1916 it was swept by fire, the damage to property being estimated at almost $2,000,000. In 1910 the population was 11,269; in 1920 it was 14,939. The area is four and one-half square miles.

PARIS, Treaties of, several treaties signed at Paris after the year 1763.

Treaty of 1763. This treaty was signed on February 10, bringing to a close the Seven Years' War in Europe (see Seven Years' War). According to its terms France gave up Canada, Prince Edward Island and Cape Breton to the English, retaining only two small islands for drying fish. All French territory east of the Mississippi River, except New Orleans and its island site, was also ceded to Great Britain, and that nation received a clear title to the possession of Nova Scotia. France likewise resigned to England its political supremacy in India. Spain ceded Florida to England, but to compensate the former country, France gave to Spain New Orleans, and all of Louisiana west of the Mississippi. The colonial empire of France was greatly weakened by this treaty, and England became the dominant power in North America and India.

Treaty of 1783. This treaty closed the American Revolution and established peace between Great Britain and its former colonies along the Atlantic coast. The United States was officially recognized as an independent nation for the first time. The treaty was signed on September 3, Franklin, Jay and Adams representing the United States. It secured to the new nation the country west to the Mississippi River, measuring from a point west of the Lake of the Woods to 31° north latitude. The boundary then ran irregularly east to the Atlantic. The forty-fifth parallel was to be the northern limit. The United States retained its fishing rights in Newfoundland as well as the exclusive right to fish on its own seacoast. Congress agreed to restore the estates confiscated during the war from British loyalists, and to abandon further prosecutions against them.

Treaty of 1814, signed on May 30, after the first abdication of Napoleon in April. The treaty restored to France most of its colonies, but French conquests were relinquished. England kept Ceylon, the Cape of Good Hope and part of Guiana, which had been wrested from Holland. France gained a small amount of land on its northern and eastern frontiers. Holland was returned to the possession of the House of Orange, Switzerland was recognized as independent, and Germany and Italy as consisting of independent states.

Treaty of 1815, signed on November 20, after Napoleon's final defeat at Waterloo. France lost the slight territories on its frontiers gained under the former treaty, and was ordered to pay indemnities amounting to about $200,000,000. The French also had to submit to the occupation of the frontier provinces by an allied army, as security for payment of indemnities.

Treaty of 1856, concluded on March 30, 1856, at the close of the Crimean War (see subhead under Crimea). By the terms of the treaty the Black Sea was to be open to the merchant vessels of every nation, but forever closed to warships, including those of Russia and Turkey. The Danube River was declared to be open to free navigation and was placed under the control of an international commission. The powers agreed to recognize the independence and integrity of Turkey, and Russia was forced to renounce its protectorate over Moldavia and Wallachia.

Treaty of 1898. This treaty brought to a close the Spanish-American War (which see). Spain evacuated Cuba, and ceded to the United States Porto Rico, Guam and the Philippine Islands, and the United States paid Spain $20,000,000.

Treaty of 1919, at Versailles. See Versailles, Treaty of.

PARIS, University of, an institution which dates from the twelfth century, and is thus one of the oldest schools in the world. Paris at that time was a great center of learning, and the University represents the outgrowth of several schools of the period. The history of this institution, like that of Paris itself, is one of revo-

lutions—ecclesiastical, political and educational. At the beginning of the sixteenth century the university consisted of about fifty colleges, and it was then recognized as a great educational center of the Christian world. Its fame, however, rested on its scholastic theology, and when schools of theology were founded in other parts of Europe, its influence began to decline. Then came the days of the political dissensions culminating in the French Revolution, when the institution was overthrown. It was reorganized in 1808 by Napoleon as a part of the University of France, but is now known officially as the *University of Paris.*

The present organization includes the faculty of Protestant theology, the faculty of law, the medical faculty, which includes the Dupuytren Museum, the faculties of science and letters, and the school of pharmacy. The faculties of science and letters are established at the famous college of the Sorbonne (which see). When the War of the Nations broke out the university had an attendance of over 17,500. In its libraries are more than 900,000 volumes and over 2,300 manuscripts.

PARIS GREEN, a bright-green powder, prepared from arsenic acid and copper acetate. It is used to some extent as a pigment for wall papers, but because of its very poisonous nature this custom is declining. Paris green is valued chiefly as a wet or dry spray to kill worms, grasshoppers, potato bugs and other insects that feed upon the foliage of plants. It is almost insoluble in water, but is usually mixed with it for wet spraying. Such a preparation must be kept constantly stirred, else the poison sinks to the bottom, leaving the top liquid harmless and the rest so strong as to be injurious to plants. For dry application, it is sometimes sprayed very finely without dilution upon potato plants, but as a rule it is mixed with flour, air-slaked lime, road dust or plaster. The strength of the mixture must be determined by the kind of insects to be killed. See INSECTICIDES AND FUNGICIDES.

PARK, MUNGO (1771-1806), a Scottish African explorer, the pioneer in the modern exploration of the "Dark Continent." He was born near Selkirk, acted for several years as surgeon in the service of the East India Company, and in 1795 was sent out by the African Association to trace the course of the Niger River. He proceeded up the Gambia, meeting great hardships at every stage of the journey, and reached the upper Niger at Sego in July, 1796. From there he followed the river toward Timbuktu, but was obliged to turn back at Silla. The account of his nineteen-months' journey into the interior, published as *Travels in the Interior of Africa,* was everywhere enthusiastically received. In 1805 Park was sent out by the British government to push further his exploration of the Niger, and had passed Timbuktu when his little vessel was set upon by savages. Park and his companions attempted to save themselves by swimming, but all were drowned.

PARKER, ALTON BROOKS (1852-), an American political leader and jurist, identified with the conservative wing of the Democratic party. He was educated at the Cortland, N. Y., Normal School and at the Albany Law School, and was admitted to the bar in Kingston, N. Y. In 1885 he became justice of the supreme court of the same state to fill an unexpired term, and was elected a year later for the full term of fourteen years. In 1898 he became chief justice of the court of appeals, an office which he resigned in 1904 to accept the Democratic nomination for the Presidency. Upon his defeat by Theodore Roosevelt, Judge Parker returned to the practice of law. In 1913 he acted as chief counsel for the plaintiffs in the impeachment of Governor Sulzer of New York.

PARKER, FRANCIS WAYLAND (1837-1902), an American educator, best known for his constructive pedagogical work while connected with the Cook County (Ill.) Normal School as its principal. He was born at Bedford, N. H., studied at various academies and at the University of Berlin, and began to teach in his native state. When the War of Secession broke out he joined the Union army and served throughout the war, rising to the rank of colonel; when peace was restored he refused to enter politics, but returned to the profession of teaching.

As principal of various schools he demonstrated his unusual ability, and in 1883 was made principal of the Cook County Normal School (after 1896 the Chicago Normal School). In 1899 he was made president of the Chicago Institute, a new school of pedagogy founded by Mrs. Emmons Blaine, in the administration of which post he died.

Colonel Parker was the inventor of no new educational method; he advocated a natural method and was opposed to strict adherence to set forms; he showed great skill and individuality in his application of the theories of Froebel and Pestalozzi to the needs of ever-changing times. He wrote *Talks on Teaching, How to Study Geography* and *Talks on Pedagogics.*

PARKER, Sir Gilbert (1862-), a Canadian novelist and statesman, born at Camden East, Ontario. He was educated in Trinity University, Toronto, and in 1886 went to Australia, where he became associate-editor of the Sydney *Morning Herald.* During the next year he made an extensive trip among the South Sea Islands and followed this cruise with a visit to Egypt, Northern Canada, India and other lands under British control. As early as 1888 he attempted literary work in an adaptation of *Faust* for the modern stage. The next year he wrote two plays entitled *The Vendetta* and *No Defence,* and in 1892 described his travels in *Round the Compass in Australia.*

SIR GILBERT PARKER

His first genuine success in literature began in 1892 with his stories of French Canadian life and adventures in the northern wilds of America. The first of these, *Pierre and His People,* appeared in 1892. Then came such highly popular novels as *Mrs. Falchion, The Trespasser, The Trail of the Sword, An Adventurer of the North,* and in 1896, *The Seats of the Mighty* and *The Right of Way.* The two last named books marked the height of Parker's power in fiction and are probably among the permanent novels in English literature.

His later works, such as *The Battle of the Strong, The Weavers* and *No Defense* (1921) have not equaled the stories previously written, probably because of the energy devoted by him to politics. His novels deal mainly with the struggle of bold and rough characters in the wilderness of Northern Canada, and frequently rise to intense dramatic power in their pictures of strife and suffering in those vast, unsettled regions.

His wide travels among British possessions made him an ardent imperialist, or believer in the closer union of the English colonies, and when he removed to London in 1896 he immediately became active in political affairs that he might aid such a policy. He was elected to Parliament in 1900 and reëlected in 1906 and 1910, and showed much zeal in bringing about tariff reforms of such a nature that the colonies might supply the greater number of Great Britain's needs. In 1902 he was knighted by King Edward VII, in 1915 was created a baronet, and in 1916 a privy councillor by King George V.

PARK'ERSBURG, W. Va., the county seat of Wood County, is located on the east side of the Ohio River, the western state boundary line, thirteen miles southwest of Marietta, O., and ninety-four miles southwest of Wheeling. The Little Kanawha River flows through the city and empties into the Ohio. Both streams are crossed by fine bridges, and are navigable, affording passage to boats, which make regular sailings to other river ports. Parkersburg is on the Baltimore & Ohio and the Baltimore & Ohio Southwestern railroads, and has electric interurban service to Marietta. In 1910 the population was 17,842; in 1920 it was 20,039, a gain of 12 per cent. The area of the city exceeds four square miles.

Parkersburg has Teripin Park, a Federal building, city and county buildings, a Y. M. C. A. building, a Carnegie Library, a convent, hospitals and the Logan Children's Home. Blennerhasset Island and Fort Boreman are points of historic interest near the city. In the vicinity are medicinal springs, petroleum and gas wells and coal and clay deposits, and the city is located in a fertile farming region. It is a prosperous manufacturing center, the value of manufactured products being $24,056,000 in 1920. Among the industrial establishments are steel plants, an oil refinery, oil-well supply works, machinery plants, vitrolite-glass, porcelain and concrete plants and furniture and shoe factories. The city has important wholesale interests.

Parkersburg was settled in 1773, was incorporated in 1820, chartered as a city in 1863 and in 1911 adopted the commission form of government. The water system is owned and operated by the city.

PARKIN, George Robert (1846-), a Canadian author and educator, since 1902 administrator or organizing representative of the Rhodes Scholarship Fund (see Rhodes, Cecil J.). Dr. Parkin was born at Salisbury, N. B., and was educated at the universities of New Brunswick and Oxford. Shortly after leaving Oxford he became principal of the College School, at Fredericton, where he remained until 1895. In that year he became principal of Upper Canada College, at Toronto. From this position he went to England to direct the enterprise which the will of Cecil Rhodes established. Beginning as a young man, Dr. Parkin has always been greatly interested in imperial

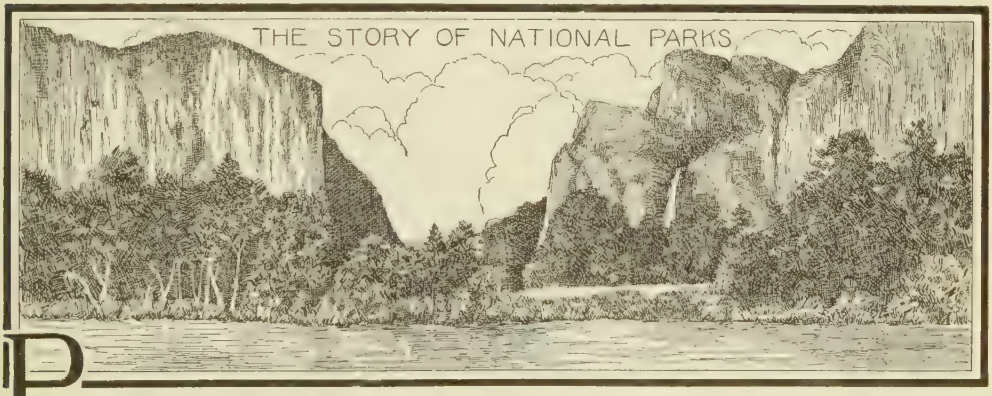
federation, and several of his best books deal with this problem. Among them are *Imperial Federation, Round the Empire,* and *The Great Dominion.* His *Life of Sir John A. Macdonald,* a standard work, reveals occasionally the imperialistic trend of Dr. Parkin's ideals, as does also a later book, *The Rhodes Scholarships.* He constantly emphasizes, too, that Canada, like other young and flourishing nations, does well to take careful note of its past. It may not be on a grand scale, but it is a foundation whose significance grows with the lapse of time.

PARKMAN, Francis (1823-1893), an American historian, born in Boston. Like all boys, Parkman took delight in stories of the Indians and their conflicts with the early settlers; but the subject took a deeper hold on him than on most, and while a sophomore in Harvard he formed the purpose of writing a history of the early days of the Frenchmen in America. To get himself as much as possible into the atmosphere of the period in which he was interested, he camped and canoed, rode horseback and practiced with the rifle until, as one historian says, he became "an adept in woodcraft and a dead shot with the rifle, and could do such things with horses, tame or wild, as civilized people never see done except in a circus."

After his graduation he went to live for some months with the Indians of Dakota, and the hardships he then endured injured his health permanently. He had meantime enlarged his plans to include the whole history of the struggle between France and Great Britain for domination in North America, and he began with the end, rather than the beginning, of the period, writing first *The Conspiracy of Pontiac.* During the composition of this and the other volumes that formed the complete work *France and England in the New World,* Parkman fought against almost unsurmountable difficulties, for his health was such that some days he could not produce more than half a dozen lines, and he was almost blind. By the aid of copyists and secretaries, however, he made a most thorough study of all the original sources for the period, visiting Europe five times for material.

The volumes of the series, besides the one above named, are *Pioneers of France in the New World, The Jesuits in North America, La Salle and the Discovery of the Great West, The Old Régime in Canada, Count Frontenac and New France under Louis XIV, Montcalm and Wolfe* and *A Half-Century of Conflict.* Parkman's work, based on one of the most indefatigable and thorough searches ever made, seems to leave nothing for any successor to add, while his style is, without being rhetorical or ornate, so vivid that the scenes he pictures live before his readers, and are more interesting than the scenes in a novel.

Consult Farnham's *A Life of Francis Parkman;* Sedgwick's *Francis Parkman.*



PARKS, National. In countries other than the United States or Canada few people consider scenery as a possession of value to a nation, unless, as in Switzerland, it attracts money-spending foreign tourists. But the two great governments of North America have recognized, in establishing national parks, that scenery really is valuable, quite apart from all consideration of money. It is an interesting, if not a significant, fact, that the most efficient races of the earth are also the greatest travelers. The American on his "vacation," or the Canadian on his "holiday," travels if he can, and in a majority of cases he goes where he can be in touch with nature, afterwards returning to his work refreshed and invigorated. Each year

thousands of people visit the great national reservations in the mountains of the West, and from intimate contact with scenes of beauty and grandeur are inspired to a better purpose and a greater accomplishment in their daily tasks; thus are the nations repaid for their investment.

To preserve the sections of great natural beauty is not, however, the sole purpose of national parks. In some of them wild animals and birds are protected in their natural state. In others historic treasures or the remains of prehistoric times are treasured, or medicinal springs are administered for the public benefit.

Parks of the United States

A distinction is made by the United States government between a national park and a national monument. The Grand Canyon of the Colorado, in Arizona, is one of the latter; it is kept from exploitation by selfish private interests, but the government spends no money in its development. For the national parks, on the other hand, the Department of the Interior does everything it can to make their wonders accessible to all, and to render a stay in them comfortable. Hotels are erected, roads and trails constructed, steamboat and stage lines established and saddle horses provided. For travelers with luxurious tastes and generous purses there are the best of hotels, and for those who prefer to be closer to nature, or who have less to spend, there are well-kept tent camps. A legion of rangers, and, in the Yellowstone Park, a detachment of cavalry, guard the forests from fire, the animals from hunters and the wild flowers and other beauties of nature from wanton destruction by vandal tourists.

The United States government now maintains the following national parks, which are here listed in alphabetical order:

Casa Grande Ruin, the remains of a huge adobe house built in Arizona by unknown prehistoric Indians, is situated in a reservation of three-quarters of a square mile, officially termed a national park. The government's protection was extended to Casa Grande in 1892. Travelers may visit this interesting prehistoric remnant by a ten-mile journey from the main line of the Southern Pacific or the Arizona Eastern Railroad.

Crater Lake National Park, with its wonderfully blue lake within the walls of a volcano extinct before the human race was cradled, was created in 1902. It is an area of 249 square miles surrounding Mount Mazama, in the Cascade range of southern Oregon. It may be reached by a short trip from the terminus of the Southern Pacific branch to the Klamath Indian Reservation.

General Grant National Park, a bit of Californian primeval forest, is really an annex to the Sequoia Park. It contains but four square miles, and was formed in 1890 to shield the famous General Grant Tree, a sequoia thirty-five feet in diameter and 264 feet in height, which started to grow before the first pyramid was built; except for the General Sherman Tree in the near-by park, it is probably the world's oldest living thing.

Glacier National Park, an alpine land of rare beauty, containing within its 1,534 square miles more than sixty glaciers, is described and pictured elsewhere in this work. It is in the northwestern corner of Montana, at the boundary of Alberta and British Columbia, and is bordered by the main line of the Great Northern Railway. Adjoining it on the north is Canada's Waterton Lakes Park.

Hawaii National Park, authorized August 1, 1916, contains three volcanoes, two on the island of Hawaii and one on the island of Maui. One of the first, Kilauea, has been continuously active for a century, and its neighbor, Mauna Loa, is the largest volcano in the world; both are described in the proper places in this work. The third volcano, Haleakala, has been quiet for nearly two centuries. The area of the park is nearly 118 square miles.

Hot Springs Reservation, in the Ozark Mountains of Arkansas, is the oldest of the national parks; it was established in 1832. In its square mile and a half are forty-six hot and several cold springs, valued since Indian days for their medicinal properties. It is but a short distance from Little Rock.

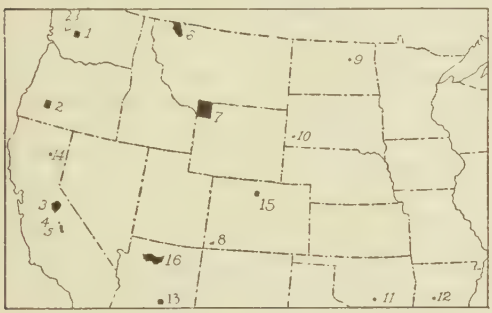
Lassen Volcanic National Park, in which is Lassen Peak, the only active volcano in the United States, was created August 9, 1916. It is forty-five miles east of the Southern Pacific's line from San Francisco to Portland, and not much farther from the main line of the Western Pacific Railroad. It contains 124 square miles.

Mesa Verde National Park, if the Spanish portion of its name be translated, means the *park of the green table.* On one of the isolated tablelike plateaus of southwestern Colorado are

traces of several stages of prehistoric life, from cave dwellings to carved stone temples. Here, in a region of beautiful and unusual mountain scenery, seventy-seven square miles since 1906 have been reserved for a park. Mesa Verde is twenty-five miles from the Rio Grande Southern Railroad.

Mount McKinley National Park, embracing nearly one and one-half million acres, is to be reserved as a great game refuge and breeding ground, for the purpose of preserving the big game of Alaska. The most prominent feature of the park is Mount McKinley, which rears its snow-capped summit 20,300 feet above the sea—the giant of the Alaskan Mountains.

Mount Rainier National Park, in which stands the tallest of the slumbering volcanoes of the Cascade Mountains, the glacier-covered Mount Rainier, is but four hours by rail and automobile from Tacoma, Wash. Nearly two miles



NATIONAL PARKS IN THE UNITED STATES

1. Mount Rainier
2. Crater Lake
3. Yosemite
4. General Grant
5. Sequoia
6. Glacier
7. Yellowstone
8. Mesa Verde
9. Sullys Hill
10. Wind Cave
11. Platt
12. Hot Springs
13. Casa Grande
14. Lassen Volcanic
15. Rocky Mountains
16. Grand Canyon

this truncated cone rises above the surrounding country, and nearly three miles (14,408 feet) above the waters of Puget Sound. In the 324 square miles of the park there are forty-eight square miles of glaciers, from which in places come jets of steam and hot springs. At the base of the mountain is what John Muir has called "a perfect flower elysium," the richest subalpine garden he ever saw. The park was authorized in 1899.

Platt National Park, in southern Oklahoma, contains a large number of sulphur and other medicinal springs. Its area is one and one-third square miles. Though not as well known nor as popular as the Arkansas springs, for it was established only in 1906, this Oklahoma watering place is visited by thousands each year. It is reached by branches of the Santa Fe and the Frisco railroad systems.

Rocky Mountains National Park, in Colorado, is the easiest of the big parks for Eastern people to visit, for it is but a day and a half from Chicago, and only a morning's ride (fifty miles) northwest of Denver. This park possesses some of the most beautiful mountain scenery on the continent; its eastern border is 8,000 feet above the sea, and within it the Rockies tower a mile higher. Visitors to it may cross the continental divide either on foot or on horseback. These 358 square miles of rugged nature were reserved by the government in 1915.

Sequoia National Park, the home of California's biggest and oldest trees, contains over a million sequoias, 12,000 of which are more than ten feet in diameter and older than the Christian Era. This is a region of beautiful mountain scenery, of cliffs and canyons and tumbling torrents; on the eastern border of the park rises Mount Whitney, the tallest peak in the United States. The park is not far from the lines of the Santa Fe and the Southern Pacific, a little over 200 miles from either Los Angeles or San Francisco. It contains 237 square miles, set aside in 1890.

Sullys Hill National Park, a tract of woods and hills on the shore of Devils Lake, N. D., contains some prehistoric ruins, but is visited by very few people. Its one and a quarter square miles were reserved in 1904.

Wind Cave National Park, in the Black Hills of South Dakota, possesses many miles of interesting subterranean passages. Most of its visitors come from Hot Springs, ten miles away. This park was created in 1903, and includes sixteen square miles.

Yellowstone National Park, the largest of the parks, and the oldest and most popular of the big ones, is described elsewhere in this work. Its geysers and mud volcanoes, its beautiful canyon and waterfall, its wild animals and birds attract thousands every year. The park contains 3,348 square miles and was authorized in 1870. Travelers come directly to the Yellowstone from Salt Lake City on the Union Pacific System, or from Minneapolis or the coast on the Northern Pacific, or by an automobile ride from Cody, Wyo., on the Burlington Route from Omaha.

Yosemite National Park, described in its proper place in this work, contains both the lovely Yosemite Valley, with the famous El Capitan Rock and Bridal Veil Falls, and the

less known but equally charming Hetch Hetchy Valley, accessible to travelers only since 1915. The park was created in 1890, with an area of 1,125 square miles. A railroad extends to it from Merced, a town on the Southern Pacific and the Santa Fe, 150 miles from San Francisco.

Parks of Canada

No mountain scenery on the American continent is more inspiring than that of the four ranges of the Canadian Rockies. Here, in six national parks, the Dominion government has preserved for public playgrounds an area more than half as great as Switzerland and greater than that of all the United States parks. There are, besides, five parks in other parts of Canada. The Algonquin and Laurentides parks are among the largest on the continent, but belong to provincial governments. The eleven national parks, like those of the United States, are administered by a branch of the Department of the Interior.

Buffalo Park, which is the home of the largest herd of buffalo in America, was created in 1907. It consists of 162 square miles of prairie land near Wainwright, Alberta, on the main line of the Grand Trunk Pacific. The original herd of 709 buffalo has now increased to over 2,000.

Elk Island Park, a reservation of sixteen square miles established in 1899 for the protection of wild life, contains elk, buffalo, moose, deer and wild fowls of many kinds. It is about forty miles east of Edmonton, Alberta, on the Canadian Northern Railway.

Fort Howe Park, the first of the Canadian historical parks, is an area of nineteen acres at Saint John, N. B. It is the site of a fort important in the defense of Canada during the American Revolution. It has been in existence since 1913.

Glacier Park, one of the few Canadian parks well known to American tourists, was opened in 1886. It contains a large number of ice fields, some of only a few acres, others many square miles in extent. The best known, the Illecillewaet Glacier, is visited by nearly all travelers through British Columbia on the Canadian Pacific Railway. The park covers 468 square miles.

Jasper Park is the largest national park in America, and one of the most beautiful. It lies on the eastern slope of the Canadian Rockies, in Alberta, and its 4,400 square miles of lovely mountain valleys and snow-topped peaks are crossed by the main lines of the Grand Trunk Pacific and the Canadian Northern railways, between Edmonton and the coast. From either of these railroads travelers may drive over well-built carriage roads or ride over trails to interesting and beautiful spots in the park. Among these are the horseshoe-shaped Pyramid Lake, at the foot of many-colored Mount Pyramid; Maligne Lake, which is twenty miles long but very narrow, and its outlet, the Maligne River, which in its passage through the rocks has scooped out mammoth potholes; Miette Hot Springs, which issue from the mountain side; Punch Bowl Falls, a geological curiosity; and Fiddle Creek Canyon, whose walls rise 200 feet above the rushing waters but are in places only twenty feet apart. When it was created in 1907 Jasper Park was only 1,000 square miles in extent, but in 1914 it was enlarged.

Maple Creek Antelope Reserve, established in 1914 for the preservation of the so-called American antelope, or pronghorn, is an area of nineteen square miles near Maple Creek, Saskatchewan, on the main line of the Canadian Pacific.

Saint Lawrence Islands Park, a group of twelve reservations among the beautiful Thousand Islands, is designed especially for summer campers and picnickers. It contains only 140 acres, set aside by the government in 1905, but is a very popular tourist resort. See Saint Lawrence River.

Rocky Mountains Park, the best known of Canada's larger parks, in the beautiful valley of the Bow River above and below Banff, contains lovely Lake Louise and the Valley of the Ten Peaks, a fairyland in the midst of grim, gigantic mountains. The park is in western Alberta, on the main line of the Canadian Pacific. It was established in 1885, and contains 1,800 square miles. This park lies directly north of Glacier National Park, in the United States.

Waterton Lakes Park, which has existed since 1895 as a small park, was enlarged in 1914 so that it now includes 423 square miles of Alberta's mountain land adjacent to Glacier National Park in the United States. It is reached by a twenty-mile drive from Pincher or Cardston, the one on the Crows Nest line of the Canadian Pacific, the other on a branch from Lethbridge.

Yoho Park, which adjoins Rocky Mountains Park, the continental divide forming the boundary between the two, is usually visited from Field, B. C., though the railroad has other stations in the park. Field nestles at the foot of rugged Mount Stephen, and from it trails and roads lead through forests of tall, straight mountain firs to the justly named Emerald Lake, and to the Yoho Valley, with its graceful falls.

Battlefields National Park. This park consists of two sections, one located in, and the other near, the city of Quebec. The first, generally known as the Plains of Abraham, includes the famous battlefield where the British under Wolfe won the victory over the French under Montcalm which made Canada a British possession. The second is the battlefield of Saint Foy. These historic spots were purchased jointly by the Dominion government and the government of Quebec, and made a national park at the Tercentenary of the founding of Quebec in 1908. C.H.H.

Consult Mills's *Your National Parks;* Muir's *Our National Parks;* Allen's *A Guide to the National Parks of America.*

Related Subjects. The following national parks are described in special articles in these volumes:

Algonquin Park
Grand Canyon of the Colorado
Rocky Mountains Park
Yellowstone National Park
Yosemite National Park

PAR'LEMENT, the name applied in France, down to the French Revolution, to certain final courts for the administration of justice, in which the edicts of kings also were registered before they became laws. Their historical importance lies in their influence upon later judiciary tribunals in France and throughout the world. They did much to summarize and unify the common law, and in dispensing justice were notably free from prejudice and party influence. The most important of these was the Parlement of Paris, although there were at least twelve provincial parlements in leading cities. Not directly connected with that of Paris, these made common cause with it in its struggles with the royal power. The Parlement of Paris dated from the fourteenth century. The functions of the parlements were chiefly judicial, although they had wide political and administrative power. They were especially influential in the reigns of Louis XI and Louis XIV. Louis XV abolished the Parlement of Paris, and constituted a new and somewhat different body, but the former counselors were recalled by Louis XVI. The Parlement of Paris and all the local parlements were abolished by the National Assembly in 1790; for although these bodies had been in the years before the Revolution ardent advocates of reform, they were as unwilling as the nobles and the clergy to give up any of their own privileges, which they had for so long a time enjoyed.

THE STORY OF PARLIAMENT

PARLIAMENT, *pahr'li ment,* in general, any deliberative assembly; but specifically, the supreme legislative body of the United Kingdom of Great Britain and Ireland. This term is also applied to the legislative body of the Dominion of Canada and that of the Commonwealth of Australia. Among all people in a tribal state of society there was always a tribal council that advised with the tribal chief; when the tribes united to form a confederacy, there was always a council representing it to advise with the king. This was true of the confederated tribes of the Anglo-Saxons that overran England. The modern Parliament of the United Kingdom is the development of these primitive councils.

In early times there were three divisions of the law-making power in England—the king, the lords and the commons. In the long course of transition to the present Parliament there occurred a complete reversal of the relative power and importance of these constituent parts. Anciently, the king was the source of legislative enactments; he was advised, how-

ever, by his lords. Only by slow degrees were the common people, by means of their representatives, admitted to a share in the councils of state. The first assembly comparable to the modern Parliament met in 1295. Not until the reign of Edward III was Parliament formally divided into two houses, the House of Commons and the House of Lords. Then began a long struggle, which was ended by the House of Commons, representing the masses, becoming by far the most important law-making power in Great Britain; the House of Lords still existed, but was shorn of much of its ancient prestige, while the sovereign lost all power to interfere in legislation. This result followed the passage of the Bill of Rights in 1689. The saying has become proverbial, "The king reigns, but does not rule." Though he has the constitutional right to be present in the House of Lords, not, however, taking part in the debate, it has been two centuries since this right was exercised.

The House of Commons. This body as now constituted consists of 670 members—465 from England, 30 from Wales, 72 from Scotland and 103 from Ireland. It is the real governing body of the nation; and, owing to the extension of the right of male suffrage, it is truly representative of the common people. It has full control of all financial legislation, the House of Lords having lost the power of amending any financial measure sent up to it by the House of Commons, although it formerly had the right of rejection. The House of Commons shapes the policies of the nation by reason of its control over the Cabinet Ministers. Before the reign of Queen Anne (1702-1714) the Ministers were in name and in fact the servants of the king; but since then they have been the servants of the House of Commons. As such they must resign when they lose the support of the Commons, which fact is evidenced by the defeat of any important measure they support. See CABINET, subhead *The British Cabinet.*

The House of Commons is an elected body; about half the members represent counties, a large number represent burroughs, and nine represent universities. Those eligible to vote for members representing the universities are their graduates. Not every citizen is qualified to be elected to the Commons. All clergymen of the Church of England, or the Church of Scotland, or of the Roman Catholic Church, and all sheriffs, and returning officers for the territory for which they act, are debarred from being candidates.

There is this peculiarity about the English elective system: a candidate does not have to be a citizen of the district he seeks to represent. He may live in one part of England and be elected by a district in another part; if defeated for election in one place, he can try for election elsewhere. If elected, he represents his district for the life of the Parliament to which he is elected, which is five years, unless it is dissolved before that length of time. Parliament usually sits from January to August or September; members formerly served without pay, but since 1911 they have received a salary of £400 each, unless already in receipt of remuneration from another public source.

The House of Lords. This is the upper house of the English Parliament, and consists now of about 650 members, composed of the spiritual lords of England (the archbishops and some of the bishops) and the temporal peers of the United Kingdom, together with the representative peers of Scotland and Ireland. All peers of the United Kingdom are entitled to seats in the House of Lords, but of the Scotch and Irish peers only a small number are chosen by their fellow-peers to represent them in Parliament. There are sixteen Scotch and twenty-eight Irish representative peers, each elected for life. The remainder of the Lords in the House belong to the peerage of the United Kingdom. See PEER.

Formerly the House of Lords was the more important of the two houses; it existed, in fact, before the House of Commons, but its importance gradually waned as the Commons steadily increased in power and influence. The Lords have now lost the power to defeat the will of the people as expressed in legislative enactments of the Commons, though they can delay the application of legislation two years. In accordance with the Parliament Act of 1911, a bill passed by the House of Commons in each of three successive sessions of Parliament, although rejected by the House of Lords, becomes a law without the sanction of that chamber. This loss of power was not accepted by the Lords without a protest, and they did not yield until the king made it clear that he would create enough Liberal peers to place the opposition in the minority. It is the King's right to create any number of new peers whenever he wishes.

Parliaments in British Dominions. The four self-governing British colonies—Canada, Australia, New Zealand and South Africa—have legislative bodies whose powers and organiza-

tion correspond to those of the British Parliament. In New Zealand the legislature is called the General Assembly, but in the other Dominions it is known officially as the Parliament. The upper house is called the Senate in Canada, Australia and South Africa, and Legislative Council in New Zealand. The lower house is called the House of Commons in Canada, the House of Representatives in Australia and New Zealand, and House of Assembly in South Africa. For further details, see *Government,* in the articles in these volumes, on AUSTRALIA; CANADA; NEW ZEALAND; SOUTH AFRICA, UNION OF. E.D.F.

Consult Ilbert's *Parliament: Its History, Constitution and Practice;* Dickinson's *The Development of Parliament during the Nineteenth Century.*

Related Subjects. A discussion of the legislative bodies of other countries will be found in the following articles in these volumes:

Congress of the United States
Diet
Duma
Reichstag

PARLIAMENTARY, *pahr li men' ta ri,* **LAW,** the system of rules by which deliberative bodies are organized and conducted. Organizations are found in every hamlet; many rural school districts have their debating societies, and churches, lodges and other organizations are banded together in such a way that at least all meetings for business purposes need to be conducted in a systematic manner. Everyone should therefore be acquainted with the fundamental principles of parliamentary law and be able to apply them in organizing and conducting any society of which he may be a member.

The fundamental principles of parliamentary law are universal in their application, but each organization should have a set of rules by which it is guided in the transaction of its business. These rules form its constitution and by-laws.

Organizing a Society. The first step in organizing a society of any sort is to secure the attendance of those interested in the project at a meeting called to effect the organization. Some one should call the meeting to order, when a temporary chairman should be elected. Following the election of the chairman should by the election of a secretary. Such measures may then be taken towards completing the organization as those assembled decide upon. The usual method of procedure is to appoint a committee to prepare a constitution and by-laws to be presented later for adoption. When these are adopted and the officers provided for have been elected, the society is permanently organized.

Officers. Every organization, no matter what its purpose, must have a president, a secretary and a treasurer. Most societies have a vice-president to preside in the absence of the president. In small organizations the offices of secretary and treasurer may be combined in one person, if such a combination appears desirable.

The President. It is the duty of the president to preside at all meetings and see that they are conducted in accordance with the constitution and the principles of parliamentary law. He should conduct the business in the order prescribed in the by-laws of the society, entertain all motions, decide all questions of order, state a motion to the society when it is ready to vote upon it and declare the result of the vote. He is also required to perform such other duties as the constitution may provide, such as appointing committees and looking after the general welfare of the society.

The vice-president performs the duties of the president in his absence.

The Secretary. The secretary's duties consist in keeping a record of each meeting of the society, and in being custodian of all its records and other papers.

The Treasurer. The treasurer is required to receive all money due the society, to be responsible for its safe keeping, and to pay the money out as the society may direct. At stated times the treasurer should render a written report, showing how much money he has received, and from what sources, and how much he has paid out, and the purposes for which it has been paid.

Conducting a Meeting. After the society is called to order the secretary's report of the last meeting should be read and approved. Then the order of business set forth in the by-laws should be followed. It is the president's duty to take up each item in this order and see that it is disposed of. If there are any items not requiring attention at that particular meeting he passes on to the next until he has gone through the entire list. When the last item has been disposed of the society adjourns.

The usual order of business, in absence of any rule to the contrary, is as follows:

(*a*) Reading minutes of last meeting and their approval.
(*b*) Reports of standing (or regular) committees.
(*c*) Reports of special committees.
(*d*) Unfinished business (not fully disposed of at last meeting).
(*e*) New business.

Motions. All business is introduced by *motions.* A member desiring to bring any matter before the society should rise and address the chair as "Mr. President," or "Madame President." The president then recognizes the member by calling his name, and he "has the floor." He then makes his motion and is seated. Before the motion can be acted upon it must be *seconded,* and this can be done by any member without leaving his seat or addressing the chair. After the motion is seconded, the president restates it to the society, and it is "before the house" for action. Debate is then in order; if there is no debate the motion is voted upon at once. If the debate continues too long any member may bring it to an end by the call of "Question."

Classes of Motions. A motion made for the purpose of securing action on any matter constitutes the *main question,* or the *principal motion,* and any other motions made for the purpose of modifying the principal motion are known as *subsidiary motions.* The most common form of the subsidiary motion is the *amendment.* For instance, A moves that the secretary be instructed to purchase a book in which to keep the records of the society, the cost not to exceed three dollars. B moves to amend the original motion by limiting the cost to two dollars. C moves to amend the amendment by limiting the cost to one dollar and fifty cents.

Here we have two subsidiary motions. How is the president to dispose of them? The answer is very simple. He must have the society vote on them in the reverse order in which they were made. First, the amendment to the amendment is voted on, then the amendment as amended. If both amendments fail, the final vote is on the original motion; if the amendments carry, the final vote is on the original question as amended.

Only one principal motion or main question can be before the house at one time. Had B moved that the society proceed to secure a lecturer before A's motion and its second had been disposed of, he would have been out of order, and the president would have refused to put his motion.

Privileged Questions. As a rule when a question is before the house it has the right of way. Debate upon it cannot be stopped nor can any other main question cause it to be set aside. There are, however, certain questions which take precedence over the main question. These are:

To adjourn
To lay the question on the table
To take a recess
Questions of privilege
The previous question

When any of the above motions is made, action on the main question must be set aside until the disposal of the subsidiary question. None of these five questions or motions is debatable. The previous question means that debate be closed and vote on the main question be taken, and it requires a two-thirds vote to be carried.

A motion to adjourn to a definite time or to the call of the chair is debatable. A motion to adjourn cannot be made while a speaker has the floor, but it may be made while action on the main question is pending.

Points of Order. Whenever a member wishes to call another member to order he rises and says, "Mr. President, I rise to a point of order." He then states his point. The president then decides whether or not the point is sustained. The chief violations of points of order consist in making motions when a principal motion is before the house, using unparliamentary language in debate, or talking upon subjects not pertinent. W.F.R.

Consult Roberts' *Rules of Order;* Fox's *Parliamentary Usage;* Reed's *Rules;* Cushing's *Manual of Parliamentary Practice.* The first named is more widely used than any other parliamentary guide.

PARLOW, *pahr'lo,* [Mary] Kathleen (1890-), a Canadian violinist, who first won fame as a youthful prodigy, but later developed into a mature artist of commanding powers. Miss Parlow is generally recognized as the greatest Canadian violinist and the greatest woman violinist of her generation. The honor of being her native city falls to Calgary, which was in 1890 a settlement of a few hundred people, hardly the sort of community which one would expect to produce one of the world's great musicians. When Miss Parlow was five years old she removed with her parents to San Francisco, where she received her first musical instruction. She made such rapid progress that her teacher took her to London in 1905 and exhibited her as a youthful prodigy.

After a few months of such exhibitions the fifteen-year-old girl became disgusted. Her love for music, however, was revived when she first heard Mischa Elman play. Under the stimulus of this other genius, she went to Petrograd to study with Leopold Auer, who had been Elman's teacher. At Petrograd, in 1908, she made her début as a mature artist. Her re-

markable success there was followed by a triumphant tour in the United States and Canada, and by recitals in the chief European cities. Her final triumph is the more remarkable because she was at one time handicapped both by lack of means to pay for her musical education and by a frail constitution which made continuous study irksome.

PARMA, *pahr'mah,* a town of Northern Italy, dating from the period of the Roman republic. As the home of many notable art treasures, Parma is one of the most interesting places in Italy. The cupola of the eleventh-century cathedral, an example of Lombard-Romanesque architecture built in the form of a Latin cross, contains Correggio's celebrated fresco, *Assumption of the Virgin,* and there are many other great paintings in the city. The most notable educational institution, the University of Parma, was founded in the sixteenth century. It had an enrolment of over 400 before the outbreak of the War of the Nations.

The city is the capital of the province of Parma. It is built on both sides of a small stream, also called Parma, and is seventy-five miles southeast of Milan. The town is circular in shape, and was formerly surrounded by fortifications, but these have been replaced by promenades. The site of the place was originally occupied by a village of the Bronze Age. Parma was the home of Correggio for many years. Population of town and suburbs in 1915, estimated to be 54,584.

PARNASSUS, *pahr nas'us,* a mountain of ancient Greece so intimately connected with the worship of certain mythological deities that its name is still a synonym of all that relates to poetry and the cultivation of the fine arts. Lowell, in his *Fable for Critics,* speaks of his own poetic ventures in the words—

> There is Lowell, who's striving Parnassus to climb
> With a whole bale of isms tied together with rhyme.

Parnassus, in modern times called Likeri, is a picturesque mountain in Southern Phocis, with twin peaks which reach a height of over 8,000 feet. Except in the hottest months snow crowns the summit. One of the most sacred of all Grecian mountains, it was looked upon anciently as the special haunt of Apollo, the Muses, Dionysus and Pan. Those frenzied devotees of the wine god, the Bacchantes, held their orgies annually on one of the two peaks, and in the groves at all times sounded the pipes of Pan. There were two especially holy spots, however. One of these was the fountain of Castalia, a spring which still bubbles, pure and delightful, out of the cleft between the two great peaks. This water was supposed to give to all who drank of it true poetic inspiration. The other sacred spot, on the southern slope, was the famous Delphic oracle of Apollo, which played so large a part not merely in the mythology but in the history of Greece.

PAR'NELL, Charles Stewart (1846-1891), an Irish statesman who was one of the foremost figures in the Irish opposition to English rule. He was born at Avondale, Ireland, his mother being the daughter of Rear-Admiral Stewart of the United States navy; was educated at Cambridge University, and in 1872-1873 traveled in the United States. In 1875 he entered Parliament for Meath, and soon had attained a commanding position, which he continued to hold almost until his death. His program from the first included a national Parliament and Home Rule for Ireland, and he displayed genius in his tactics, playing off one party against another for his own ends. Bills to which in reality there could be no objection he and his followers opposed, merely to delay legislation and to focus attention upon their demands.

In the interests of the Land League, whose object was to improve the condition of the poor tenants, Parnell visited America in 1879 and collected a large popular subscription. After 1880 he was the formal as well as the actual head of the Irish party in Parliament, and his agitation on the land question was so persistent that in 1881 he was arrested and imprisoned for six months. When Gladstone became head of the Ministry in 1886 on a Home Rule platform, Parnell supported him, but the party was speedily defeated and went out of office. In the next year Parnell and his associates were accused by the *London Times* of conspiracy against the government, and facsimile letters were published to prove their guilt. Parnell protested in Parliament that the letters were forgeries, and the finding by a commission that such was indeed the case made Parnell more powerful than he had ever been before.

Meanwhile, rumors had become current connecting Parnell's name with that of Mrs. O'Shea, the wife of one of his supporters, and in 1889 Captain O'Shea began divorce proceedings, naming Parnell. No defense was offered and the divorce was granted, but Parnell's reputation and influence were so shattered that he was deposed as leader of the Irish party, John Redmond succeeding him. The struggle to regain his ascendancy injured his health, and he died

in October, 1891, three months after his marriage to Mrs. O'Shea. In 1914 his widow published an account of their relations from their first meeting. See HOME RULE.

Consult Moore's *Parnell and His Ireland;* O'Brien's *Life of Charles Stewart Parnell.* Mrs. O'Shea's book is *The O'Shea-Parnell Divorce Case.*

PARODY, *pair' o di,* a comic imitation of any serious writing. The subject need not be the same—indeed, should not; but the manner and form must suggest the original work. Parodies on verse are more common than those on prose, though Washington Irving's *Knickerbocker's History* was originally intended as a parody, and Bret Harte mimicked the style of various authors in his *Condensed Novels.*

Parody is very old, for the first known example, the *Battle of the Frogs and Mice,* dates from at least the fifth century B.C.; and it has always flourished alongside of serious literature. The *Acharnians* of Aristophanes was a parody on Euripides; *Don Quixote* was neither more nor less than a parody on the exaggerated romances of chivalry; and the nineteenth century was particularly rich in such burlesques. Browning, Rossetti, Wordsworth and Whitman by their mannerisms especially lend themselves to being parodied, and some of the imitations are remarkably clever and striking. One of the most popular parodies of recent years is by the minor poet, Ben King, on *If I Should Die To-Night.* It follows:

If I should die to-night
And you should come to my cold corpse and say,
Weeping and heartsick o'er my lifeless clay—
If I should die tonight, and you should come in
deepest grief and woe—
And say, "Here's that ten dollars that I owe,"
I might arise in my large, white cravat, and say,
"What's that?"

If I should die to-night and you should come to
my cold corpse and kneel,
Clasping my bier to show the grief you feel—
I say, if I should die to-night and you should
come to me and there and then
Just even hint 'bout payin' me that ten,
I might arise the while, but I'd drop dead again.

PAROLE, *pa rohl',* derived from the Latin *parabola,* meaning *speech* or *parable,* is the shortened form of the French phrase *parole d'honneur,* or *word of honor.* The term is used in a legal sense to distinguish verbal agreements, or those not written under seal, from written contracts. In criminal law it refers to the release of a prisoner convicted of crime, upon his word of honor.

In a military sense it refers to the pledge of honor given by a prisoner of war, that if released he will not take up arms against his captors or their allies during a certain period. If freed by exchange, he is released from this pledge. Although a breach of the pledge is punished by death in case of recapture, the soldier's agreement is evidently not thought sufficient surety, for paroles are seldom granted among prisoners of war.

The term also applies to the military watchword, or countersign, used to obtain an accurate identification of persons. In the forty-fourth Article of War of the United States army, it is stated that—

Any person belonging to the armies of the United States who makes known the watchword to any person not entitled to receive it according to the rules and discipline of war, or presumes to give a parole or watchword different from that which he received, shall suffer death or such punishment as a court martial shall direct.

PARRAKEET, *pair' a keet,* a division of the parrot family in which the birds are distinguished by their small size, their long, graduated tails and the fact that the male and female differ widely in color. In one species, the

THE PARRAKEET

male is green, and the female is a bright red. Parrakeets are found in Northern Africa and in India, Malaysia and Australia. The best-known Indian species is the *rose-ringed parrakeet,* which is about sixteen inches in length, ten inches being the measure of the tail. A small parrakeet that sleeps hanging to the branch of a tree is called the *bat-parrot.*

The *grass parrakeet* of Australia and Tasmania lives among grasses and reeds, rather than in trees. A species of African parrakeets that makes a great show of affection is called the *love bird.* The beautiful *Carolina parrakeet,* the only species found in the United States, was once a familiar summer visitor in the central part of the continent, but it has been almost exterminated. This bird of brilliant green and orange plumage is now seen

only in the dense swamps of Central Florida and along the lower valley of the Mississippi River.

PARRHASIUS, *pa ra' shi us,* a famous Greek painter who lived in the time of Socrates. He was born in Ephesus, but became a citizen of Athens. The character of his work is known only from the criticism of ancient writers, as none of his paintings has survived. Pliny states that he was the first artist who made the proportions of his pictures correct, and that he excelled in drawing the outlines of objects. He is said to have been the first who knew how to give the effect of solidity by the use of light and shade. Most of his paintings were on mythological subjects; a picture of Theseus which he painted was placed in the Capitol of Rome.

An interesting story is told of his contest with a rival, Zeuxis. The latter displayed his picture of grape clusters, painted so truly that the birds tried to eat them; he then asked Parrhasius to draw aside the curtain that was hung before his own picture. Whereupon Parrhasius claimed the victory, for the curtain was the picture itself, and it was a greater feat to deceive an artist than to deceive the birds.

PARRISH, *pair' ish,* MAXFIELD (1870-), a noted American illustrator whose pictures are distinguished for their poetic design, rich coloring, delicate humor, clever gradations of tone and detail of background. He was born in Philadelphia. After graduating from Haverford College, he studied at the Pennsylvania Academy of Fine Arts, in Philadelphia. In 1897 his design won a prize offered by the *Century Magazine* for a poster to be used as a cover, and since then his exquisite poetic drawings have appeared regularly on the covers of many of the foremost periodicals. Although best known as an illustrator, he shows ability in decoration, as is evidenced by his mural decorations of Old King Cole on the walls of the grill room at the Mask and Wig Club of Philadelphia. Among the notable works for which he has furnished illustrations are Mrs. Wharton's *Italian Gardens, Arabian Nights, Mother Goose in Prose,* Irving's *Knickerbocker's History of New York* and Eugene Field's *Poems of Childhood. The Sandman* and *The Bulletin Board* are two of his best-known paintings.

PARRISH, RANDALL (1858-), an American novelist, born in Henry County, Ill., and educated at the University of Iowa. After practicing law for several years at Wichita, Kan., he prospected during 1883-1885 in Arizona and New Mexico; later he engaged in newspaper work in Denver, Omaha and Chicago. He soon began to write novels, and they have appeared in rapid succession, each winning for its author great popularity. *When Wilderness Was King, A Sword of the Old Frontier, Beth Norvell, Prisoners of Chance, The Last Voyage of the Donna Isabel, Beyond the Frontier, My Lady of Doubt,*

RANDALL PARRISH

My Lady of the North, My Lady of the South, Don MacGrath, The Air Pilot and *The Red Mist* are the titles of some of the many novels to his credit. In some of these he has introduced his experiences as a prospector in the West.

PARROT, *pair' ut,* a brilliantly-colored, tree-dwelling bird, with stout, hooked bill, fleshy tongue, and feet especially constructed for climbing. There are nearly 600 species, distributed throughout all tropical countries, but most abundantly in Central and South America, Australia and the Pacific islands. Parrots are sociable birds, usually living in flocks. Their voices are loud and harsh, and they keep up a continual screaming. They eat a variety of food, including seeds, nuts, insects, nectar and, in some cases, carrion. They nest in holes in trees, and sometimes in banks of earth, and lay two or three white eggs. Many species are common in captivity, and may be taught to speak a very little. The average length of life of the parrot is sixty years.

Among American parrots are the splendid *macaws* and many smaller species, only two of which, however, are found north of Mexico. In New Zealand are found the *brown parrot,* also called the *kaka parrot,* in imitation of its voice; the *kea* or *mountain parrot,* a large species, infamous for its habits of killing sheep; and the *owl parrot,* an odd species with hairlike feathers about its eyes and known as a night prowler. In the Australian region are found the *cockatoos,* very large birds, usually white in color, tinged with rose or sulphur-yellow and having large frontal crests; and the *lories* and *lorikeets,* small handsome birds with

pointed wings and rounded tails. African parrots are small in size, usually less than twelve inches in length. *Pygmy parrots,* from three to five inches long, are found in the Papuan Islands. The true *parrakeets* form a numerous group, of wide distribution (see PARRAKEET).

YELLOW-HEADED PARROT

The parrot seen most commonly in homes is a native of Cuba. About 10,000 of this species are brought into the United States and Canada annually. The Cuban parrot is about ten inches long, and has a green body, white forehead, scarlet throat, brilliant wings and tail feathers, which display a gorgeous mingling of blue, green and scarlet.

The Parrot in Captivity. Parrots are popular cage birds because their readiness in imitating human speech makes them a source of amusement. There are people who make it their business to train parrots to be household pets. These "educated" birds bring much higher prices than their untrained cousins. The former are sold for prices ranging from $25 to $500, the most expensive being able to repeat sentences and even to sing songs. An untrained bird may be purchased for five or ten dollars.

Parrots must have warmth, cleanliness, pure, wholesome food and fresh air if they are to remain healthy in captivity. Soft, moist food, such as corn-meal mush, bread and milk, or toast soaked in coffee, is best for the young birds, while the older ones thrive on sunflower seed, hemp, unhulled rice, cracked corn, pilot crackers, nuts, mellow apples and bananas and raw or cooked vegetables. Cuttle-fish shell, crushed oyster shell and pulverized charcoal are excellent aids to digestion, and ground cayenne pepper serves admirably as a relish. The birds should not be given water freely until they have become accustomed to their new climate.

The captive parrot is found frequently in literature, especially in tales of the sea. Robert Louis Stevenson introduces one in his enticing adventure story, *Treasure Island.* Readers of Louisa M. Alcott's *Little Women* have often laughed over the antics of "Polly," the parrot which belonged to the eccentric old aunt of the March girls.

M.A.H.

Consult Page's *Parrots and Other Talking Birds: Their Food, Care and Training;* Greene's *Parrots in Captivity.*

PARRSBORO, *pahrz'bur o,* a town in Cumberland county, Nova Scotia, situated on the north shore of the Basin of Minas. It is of importance chiefly as a shipping point for coal, both by rail and by steamer. The Cumberland Railway & Coal Company provides rail connection to Spring Hill, thirty-two miles north, on the Intercolonial Railway. It has steamer connection with various other ports in Nova Scotia, including Kingsport and Wolfville, both on the south shore of the basin and on the Dominion Atlantic Railway. Shipbuilding and lumbering are important industries, and there are also factories for making larrigans and various wood products. Parrsboro has a fine Dominion post office, and owns and operates its waterworks and electric lighting system. Population in 1921, 2,748.

PARRY, *pair'i,* SIR WILLIAM EDWARD (1790-1855), a British Arctic explorer who established what remained for forty-eight years the "farthest north" record. After three expeditions in search of the Northwest Passage, which were unsuccessful, but during which discoveries of importance were made, he set out in 1827 in the *Hecla* to search for the North Pole. Leaving his ship in far northern seas, he continued the journey across the ice, reaching latitude 82° 45′. The account of his journey was published in *Narrative of the Attempt to Reach the North Pole.* In 1829 he was knighted and in 1852 attained the rank of rear-admiral. For two years before his death Parry was governor of Greenwich Hospital. See NORTHWEST PASSAGE.

PARRY SOUND, a town in Ontario, on a small arm of Georgian Bay from which it takes its name; it is the central town of the Parry Sound district. Parry Sound is on the eastern shore of Georgian Bay, about equally distant from its northern and southern ends. It is 150 miles northwest of Toronto and about 200 miles from the terminus of the proposed Georgian Bay Ship Canal. Flowing into the sound at this point is the Sequin River, which is not navigable; it adds, however, to the charm of the locality, which is noted for its rugged scenery. Parry Sound is popularly known as the Gateway to the Highlands of Ontario, and is visited by hundreds of tourists, who come either by one of the lake boats, which make the town a port of call, or by one of the three railroads, the Grand Trunk, Canadian Northern and

Canadian Pacific, which serve it. Population in 1911, 3,429; in 1921, 3,546; in 1918 it had about 6,500.

One of the chief reasons for the striking increase in population is the establishment of a great munitions factory in the town soon after the beginning of the War of the Nations. This plant has about 3,000 employees. In peace times Parry Sound is known for its sawmills and planing mills, tannery, smelter and chemical works. The chief varieties of lumber are hemlock and pine, although several hard woods are used. Wood alcohol is one of the chief articles made. The town owns its electric power and lighting plant and its waterworks.

PARSEES, or **PARSIS,** *pahr'seez,* a religious sect of India which takes its name from Pars or Fars, a province in Persia, where it was founded. The parsees are the modern followers of Zoroaster (which see). They have great veneration for fire, regarding it as the emblem of purity and good. The invasion of the Mohammedans in the seventh century drove the greater number to the western coast of India, where they have advanced and prospered, but their worship has accommodated itself to Hindu ideas and practices. Bombay is their headquarters, and at present they number about 90,000. The small number that remained in Persia were subjected to persecution and sank into poverty. They preserved their religion intact, however, and to-day they are respected by Europeans for their honesty and integrity. The Parsees do not marry persons not of their caste or creed, nor do they eat anything prepared by one of another religion. Among their curious customs is the disposal of their dead in towers of silence (which see), now happily being abandoned through British influence.

PARSIFAL, *pahr'si fahl,* a noble and religious music drama by Richard Wagner, the story of which is founded upon the legend of the Holy Grail (see Holy Grail). Wagner adopted, with some changes, the version of the legend found in a famous poem entitled *Parzival,* written about 1205 by Wolfram von Eschenbach, one of the greatest poets of medieval Germany. *Parsifal* was presented for the first time at Bayreuth, Germany, in 1882, its production elsewhere being forbidden until the expiration of the copyright. On Christmas Eve, 1903, it was produced at the Metropolitan Opera House of New York, for the first time outside of Bayreuth, and now is given regularly each year by grand opera organizations in all the great cities. Its presentation requires several hours, and it is customary to divide the performance into two sections, with an intermission of from one to two hours. This masterpiece contains some of the most inspiring music and most beautiful scenic pictures of any of the great composer's works.

The scene of the drama is in or near the Castle of Monsalvat, Spain, also known as the Castle of the Holy Grail. Parsifal is a young and inexperienced knight who is brought to the castle by another knight to witness the adoration of the Holy Grail. Unable to understand its sacred character, he is cast out by the other knights. Another important character is Amfortas, formerly a knight of the Holy Grail and keeper of the Holy Spear. Amfortas has fallen into the power of a magician, Klingsor, who has wrested the Spear from him and wounded him with it in the struggle. The magician uses a beautiful woman, Kundry, to tempt the knights to break their holy vows, but neither she nor Klingsor succeed in their efforts to lead Parsifal astray.

This young knight not only resists temptation, but recovers the Holy Spear from Klingsor. He then begins a search for the Castle of the Holy Grail. When many years have passed he meets another knight in company with Kundry, who has repented. After baptizing her, Parsifal is led to the castle by the knight, where he heals the wound of Amfortas by touching it with the Spear, and where he is proclaimed king of the knights of the Holy Grail.

PARSING, *pahr'sing.* In the days when every schoolboy studied Latin grammar, schoolmasters would call for the part of speech of any word by asking "Pars?"—this being the Latin equivalent of *part.* Thus it has come that we are said to *parse* a word in English grammar when we tell the part of speech to which it belongs and explain how it is used in the sentence.

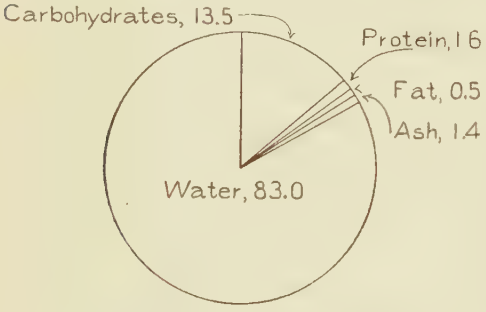
In parsing the noun, for instance, it is necessary to state its classification, whether common or proper; its person, number, gender and case; and its construction, or syntax. For examples of parsing, see the articles in these volumes on the parts of speech.

PARSLEY, *pahrs'li,* a garden herb cultivated chiefly for its leaves, which have a pleasing flavor that makes them popular as a garnish or as a seasoning. If permitted to grow to maturity the plant will reach a height of three feet and bear small, greenish-yellow flow-

ers, but the leaves are usually picked before blossoming time. Several kinds of parsley are grown in gardens, the favorite variety being the one with curled leaves. The seed, which germinates very slowly, should be sown as soon as the ground can be worked. Seed should be covered with half an inch of dirt, pressed down compactly. The growing plants should be thinned until they are six inches apart in the rows, and be kept free of weeds. If leaves are desired for garnishing through the winter, plants may be transplanted to window boxes. Some housewives put parsley leaves in paper bags, hang them away to dry, and use them later with other herbs in soups.

This fragrant herb was well known to the ancients. In the stories of Hercules its leaves are mentioned as forming one of his garlands of victory, and the Greeks used parsley wreaths both on festive occasions and at their funerals. Because the plant was so slow in coming up, they had a common saying that the seed had to go to Hades before the young shoot could appear above ground. There is an old English proverb of like import—"Parsley seed goes to the Devil and back again nine times before it comes up."

PARSNIP, *pahrs'nip,* a familiar garden plant of the parsley family, native to Europe and Asia, and cultivated extensively in America as a table vegetable. It grows from two to



COMPOSITION OF A PARSNIP

As a heat producer parsnips average well with most vegetables, but their fuel value is low—only 295 calories per pound (see CALORIE).

three feet in height, bearing attractive, fernlike leaves and bright yellow flowers. The edible portion is the long, white, tapering root, which has a sweetish flavor, agreeable to most people. The roots of the wild parsnip are somewhat sharp in taste, but cultivation has made them more delicate and increased their size. Parsnips thrive in rich, deep soil. In the latitude of New York the seed is sown in April, and covered with earth half an inch deep. After the plants come up they should be thinned until about six inches apart. If neglected they run wild and become troublesome weeds.

The parsnip is distinctly a winter vegetable, whether used as a table food or as fodder for cattle. The quality of the roots is improved, rather than injured, by frost. Those for immediate use are generally taken up in October or November and stored in damp sand or earth; the others may be left in the ground until needed. Parsnips are appetizing when boiled, baked, stewed with meat, fried or made into fritters. They have about the same nutritive qualities as carrots, which they resemble (see CARROT).

PARSONS, *pahr's'nz,* KAN., a city in Labette County, in the southeastern corner of the state, twenty-three miles north of Oklahoma, thirty-seven miles west of Missouri and 137 miles southwest of Kansas City. It is on the Neosho River and on the Missouri, Kansas & Texas and the Saint Louis-San Francisco railroads. An interurban line extends to Independence and Coffeyville. The area of the town is four square miles. Its population, which was 12,463 in 1910, was 16,028 in 1920, a gain of nearly 29 per cent.

Interesting features of the city are Forest and Glenwood parks; the Missouri, Kansas & Texas general office and station building, which was constructed in 1904 at a cost of $1,000,000; the Federal building, Carnegie Library, railroad Y. M. C. A., Masonic Temple, Elks' Theater, the State Hospital for Epileptics (which has 600 inmates) and Mercy Hospital. Parsons has an important wholesale and jobbing trade, large locomotive, boiler and car shops, brass and iron foundries, flour and feed mills, grain elevators, creameries, nurseries and garment factories. In the vicinity natural gas is found and is used for heating and lighting. Parsons was founded and incorporated as a third-class city in 1871, and as a second-class city in 1873. It adopted a modified commission form of government in 1911, with a mayor and four commissioners.

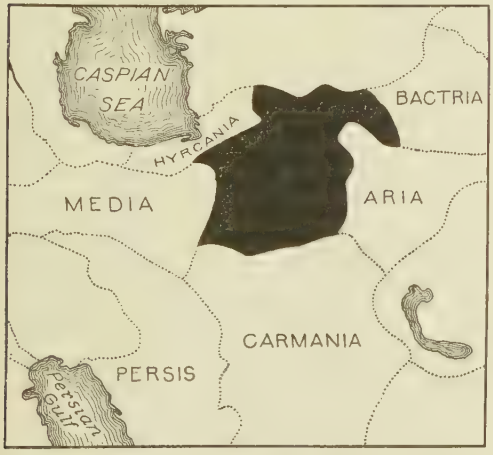
PARTHENON, *pahr'the non,* a temple of ancient Greece, one of the most famous relics of antiquity, and generally considered the most perfect building ever constructed. It stood on the Acropolis at Athens, and was dedicated to Athene (Minerva), patron deity of the Athenians. No other temple was quite so sacred. The building was about 228 feet in length, 101 feet in width and sixty feet in height, and was constructed throughout of most carefully se-

lected white marble. As it was in the Doric style of architecture, the great pillars, thirty-four feet in height, eight at each end and seventeen at each side, were severely plain. Above the columns was a frieze, carved in low relief, of exquisite beauty, and gigantic sculptures ornamented other parts of the building. Rich colors—gold, red and blue—were used in the decoration of these designs. Within the temple there were two halls, one of which contained the great ivory and gold statue of Athene by Phidias.

The Parthenon, like so many other beautiful buildings of Athens, dates from the time of Pericles. It served its original purpose until about the sixth century, and then became a Christian church. Later it was a Mohammedan mosque, and a minaret was added, but throughout these changes it was almost perfectly preserved. When the Venetians were striving to conquer Athens in 1687, the Parthenon was used as a powder house by the Turks, and suffered much from an explosion. Many of the sculptures were afterward taken to London (see ELGIN MARBLES). In its ruined state the Parthenon is still a beautiful and inspiring sight.

For illustration of the building as it appears to-day see "The Glory That Was Greece," page 2605. Consult Gardner's *Ancient Athens.*

PARTHIA, *pahr'thi a,* an ancient empire of Central Asia, to the southeast of the Caspian



LOCATION MAP
The irregular black area was ancient Parthia.

Sea. The inhabitants were extremely brave and were noted for their method of fighting on horseback with bows and arrows. The country was conquered by Cyrus the Great in the sixth century B. C., and also by Alexander the Great. About 250 B. C. the people revolted and formed a separate kingdom under Arsaces, who founded a dynasty of tyrannical rulers. The Parthians successfully resisted the Romans, who repeatedly invaded their territory, but owing to internal dissension fell before the Persians, and the dynasty of Arsaces gave place to the Persian dynasty of the Sassanidae.

PARTICIPLE, *pahr'ti si p'l.* The word is derived from the Latin *partake.* In English grammar the participle is a form of the verb which "partakes" of the nature of adjective or noun. It still retains its verb character, however, and may have an object, a complement, or an adverbial modifier. In this respect, therefore, the participle is like the infinitive (which see); so that with the infinitive it is frequently classed as a *verbal.*

Take for illustration the transitive verb *draw.* In the active voice, *drawing,* the *present participle,* expresses action in progress; *drawn,* the *past participle,* expresses finished action; *having drawn,* the *perfect participle,* makes use of an auxiliary verb to express the idea of action which has just been completed. In the passive voice, *being drawn* is the present, *drawn* the past, *having been drawn* the perfect participle.

Uses of the Participle. *As an Adjective.* "A towering statue known as *Liberty Enlightening the World* stands at the entrance to New York harbor." In this sentence there are two words ending in *ing,* the distinguishing mark of the present participle; but *towering,* though participial in form, is not so in use and has none of the verbal powers of the participle. Being used only to describe, it is a pure adjective, belonging to the class sometimes called "fossil participles." *Enlightening,* on the other hand, is a true participle; it not only modifies the noun *liberty,* thus making it an adjective by use, but takes *world* as a direct object, thus asserting its verbal nature. *Known* is a past participle, used adjectively to modify *statue,* and is itself modified by an adverbial phrase.

As a Noun. The present participle, or a participial phrase formed from it, may serve as a noun in four different ways: as the subject, object or complement of a verb, or as the object of a preposition. In the old proverb, "Doing nothing is doing ill," the first *doing* is a participle used as a noun, and with its object, *nothing,* serves as the subject of the sentence. The second *doing* is the predicate complement, taking as its object the noun *ill.* In the sen-

tence, "I prefer riding swiftly to going so slowly," the participle *riding* is the object of *prefer,* and by virtue of its verbal character is modified by the adverb *swiftly.* Similarly, *going,* the noun object of the preposition *to,* is modified by the adverb *slowly.*

Many grammarians call the participle, in certain of its noun uses, a *gerund,* and the names *verbal noun, verb-noun, noun-verbal* and *infinitive in "ing"* are also used—the latter name being given because the thought expressed by the participle may be expressed in the same fashion by the infinitive; as, *To do* nothing is *to do* ill. This, however, is a much more complicated treatment, and those who favor the simplifying of English grammar prefer to consider the verbal noun and the gerund as noun uses of the simple participle.

It is necessary to distinguish between the present participle and the abstract noun ending in *ing.* For instance, in the sentence, "Living well does not mean simply the eating of three square meals a day," *living* is a true participle, but *eating* is an abstract noun which could not take any of the modifiers of a verb. Whenever a word ending in *ing* is preceded by an article or a qualifying adjective it is an abstract noun. By changing the sentence to read, "Living well does not mean simply eating three square meals a day," we make *eating* a participle, object of a verb and completed by an object of its own.

Used Independently. The participle has the same independent uses as the infinitive. It may belong to the sentence as a whole, without modifying any individual word; as, *Granting* all that, the mistake still seems inexcusable; *speaking* of adventures, I once had an interesting experience; that *being* the case, you may proceed with the examination. It may also be used independently in exclamations: *Coming* to-day! *Reading* Homer!

Parsing the Participle. To parse the participle it is necessary to tell its form, whether present, past or perfect, active or passive; to explain how it is used, and to name its modifiers, if any.

Type Sentence: *Telling an amusing story is a time-honored method of beginning an address, and one that is practiced by nearly all speakers experienced in the handling of audiences.*

Telling is the present active participle, used as a noun, and with its object *story* serving as the subject of the sentence. *Beginning* is the present active participle, used as a noun, object of the preposition *of,* and having as its own object the word *address. Experienced* is the past passive participle, used as an adjective to modify *speakers,* and itself modified by an adverbial phrase. (Note: *Amusing* and *time-honored* are pure adjectives—examples of the "fossil participle." *Practiced* is not a participle here, but part of the verb *is practiced. Handling* is an abstract noun.) L.M.B.

PARTINGTON, Mrs. See Shillaber, Benjamin Penhallow.

PART'NERSHIP, an association of two or more persons whose object is to carry on business or trade for gain, but obliged to share losses, as well. The relation must be voluntary and may be formed by written contract, verbal agreement, or by evidences and acts which tend to prove the existence of a partnership. If the object of the business is contrary to public policy, or illegal, the contract is not binding. The rules and laws governing partnership vary under different state and provincial laws, and are the subject of conflicting decisions in the courts. All the general rules applying to contracts govern contracts of partnership. See Contract.

After the partnership is formed, the association is generally called *a firm,* and business is transacted under a firm name. The firm becomes a sort of legal individual, having its own creditors, debtors, capital and property, and being responsible to the partners for their shares of the capital which has been contributed by them for the conduct of the business. The firm as such cannot sue or be sued, but all suits must be in the name of the partners individually.

Kinds of Partnership. A *general partnership* is an association for the transaction of general business, or trade. When an association is formed for the prosecution of a single enterprise it is known as a *particular partnership. Limited partnerships* are also formed in which there is one general partner liable for the debts of the firm, associated with one or more special partners responsible only to the extent of their contributions to the capital. Some states authorize limited partnership associations, in which the members are all special partners; these associations differ from corporations and joint stock companies chiefly in that their capital stock is not divided into a large number of transferable shares (see Corporation).

Partners, Their Rights and Duties. Extensive powers are extended to the members of a firm, and heavy responsibilities rest upon them. One partner has a right to hold all others to their agreement, and to have access to all records of the firm's business. Each member of the partnership is responsible for the acts

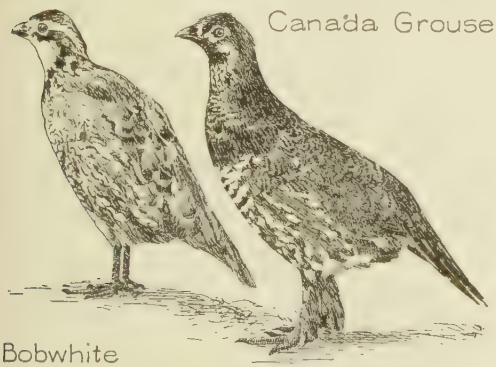
of any one of their number, and each is liable for any debts contracted by a partner in the transaction of the general business. Partners may not use the general funds for their own benefit, and are responsible for a strict account of all expenditures in the firm's name.

The members actively conducting the business are known as the *real,* or *ostensible,* partners. Members whose relation to the firm is not publicly known are called *secret,* or *dormant,* partners; the latter take no part in the business management. *Silent* partners take no active part in the business, but share in the liabilities and the profits. *Nominal* partners assist in the business, but receive no share of the profits.

Dissolution. A partnership may be dissolved by agreement, by operation of law or by judicial decree. Any unlawful action of the firm legally dissolves the association. Any change in membership effects a dissolution of the partnership, and if business is continued it must be under new articles of agreement. At dissolution the debts of the firm are paid first, then the capital is distributed; if all this is insufficient to meet the debts, the latter are paid out of the personal property of the members. A *liquidating* partner is one chosen to take charge of the settlement of the business.

Consult Parsons' *A Treatise on the Law of Partnership.*

PARTRIDGE, *pahr'trij,* a name applied loosely in America to a number of game birds belonging to the grouse family. The bird known as the partridge in the southern part of the United States is called *quail,* or *bob-white,* in the North and the East (see QUAIL). The *ruffed grouse* (see GROUSE, subhead *Ruffed Grouse*) is called partridge in New England, and the Canada grouse is called *wood, cedar* and *spruce* partridge by Canadians.



TWO MEMBERS OF THE FAMILY

The true partridges are found in the eastern hemisphere, and include about 150 species. The common gray, or Hungarian, partridge is typical of the group; this bird has been imported into America in large numbers for breeding purposes. It is found throughout Europe, especially in Great Britain, and occurs also in Northern Africa and Western Asia. The largest of these partridges is about a foot long. It has ash-gray plumage on the upper parts of the body, with brown and black markings, and the male has a distinguishing crescent-shaped spot of deep chestnut on the breast. Grains and insects are sought as food; the nest is laid usually on the ground, and contains from twelve to twenty eggs. The Hungarian partridge is a favorite game bird in Europe.

Consult Sandys and Van Dyke's *Upland Game Birds;* Job's *Propagation of Wild Birds.*

PARTRIDGE, WILLIAM ORDWAY (1861-), an American sculptor, art critic and lecturer. One of the delights of his artistic life is to present in marble and bronze the busts of the world's greatest poets. Included in his well-known series are the busts of Shakespeare, Milton, Byron, Tennyson, Burns, Poe and Edwin Markham.

Partridge was born in Paris. He was educated at Columbia University, New York City, and studied sculpture in Florence and Rome. His first large work of note was the fine bronze statue of Hamilton, erected in Brooklyn, N. Y. That city possesses another great monument to his art—an equestrian statue of General Grant. In 1894 he completed a statue of Shakespeare, which was unveiled at Lincoln Park, Chicago. Among his most popular books are *Art for America, The Technique of Sculpture* and *Song Life of a Sculptor.*

PARTS OF SPEECH, in grammar, are classifications of words associated according to their use and meaning. Such a division of words into classes is not arbitrary, or invented merely for convenience; words themselves present natural divisions, and grammarians have merely given names to the classes. There are in all eight parts of speech: nouns, pronouns, adjectives, verbs, adverbs, prepositions, conjunctions and interjections.

Certain of these classes are closely related to each other; for instance, a noun is often used for an adjective, as in "a *gold* ring," or an adjective for a noun, as in "We pity the *poor.*" A verb-form, too, frequently takes the place of a noun, in such sentences as *"To go* will be the wisest policy," *"To have done*

such a thing would have meant ruin;" yet the fundamental distinction between the parts of speech remains.

Related Subjects. A detailed discussion of the various parts of speech will be found in the following articles in these volumes:

Adjective	Noun
Adverb	Pronoun
Conjunction	Preposition
Interjection	Verb

PAS, formerly known as Le Pas (*le pah*), or The Pas, a town in the central-western part of Manitoba. It is on the Saskatchewan River and the Canadian Northern Railway, and is the southern terminus of the Hudson Bay Railway (see Hudson Bay, for map). The completion of this new railway will add greatly to the commercial importance of the town. It is 258 miles east of Prince Albert by rail, and eighty-seven miles northeast of Hudson Bay Junction, where connection is made with the Winnipeg-Prince Albert line. Population in 1916, about 2,500.

The vicinity of Pas has a supply of timber which is almost unlimited, and the town's largest industrial plant is a lumber mill, with 500 employees and a monthly output of 5,000,000 feet of lumber. The town has a station of the Royal Northwest Mounted Police, a Dominion lands office and an Indian agency for the adjoining reservation. Some gold and copper has been found in the neighborhood, and the fishing and hunting are excellent.

PASADE'NA, Cal., a beautiful residential city, and a health and winter resort, situated in Los Angeles County, nine miles northeast of the city of Los Angeles and twenty miles from the Pacific Ocean. It is served by the Atchison, Topeka & Santa Fe, the San Pedro, Los Angeles & Salt Lake and the Southern Pacific railroads, and by interurban lines. In 1910 the population was 30,291; in 1920 it was 45,334, a gain of 50 per cent.

Pasadena occupies an area of eleven square miles in the upper San Gabriel Valley, and is surrounded by flourishing orange and lemon groves. To the north and east are the Sierra Madre Mountains; in the vicinity are fine automobile roads and private estates commanding magnificent views of the mountains and plains. On Mount Wilson is the Solar Observatory of the Carnegie Institute of Washington; Mount Lowe and Echo Mountain are other prominent hills near the city. Pasadena has five small parks (the largest containing twenty acres), and the Busch Sunken Gardens.

The prominent buildings are the Federal building, erected in 1915 at a cost of $250,000, four palatial hotels, a public library, a $200,000 high school, hospitals and churches. The educational institutions include the Throop College of Technology, the Nazarine University and a number of excellent private schools. The principal business of the city is the preparation of citrus fruits for the market. Industrial establishments include packing houses, drying and canning factories, and manufactories of woodwork, boots and shoes, cut glass, flour and brick.

Pasadena was settled in 1874 by colonists from Indianapolis, Ind., who planted and cultivated the first orchards here. It was incorporated in 1886 and in 1913 adopted the commission form of government. The electric light plant, water system and sewer farm and incinerator are owned and operated by the municipality.

PAS'CAL, Blaise (1623-1662), and **PASCAL'S LAW.** This French philosopher, mathematician and author was born at Clermont-Ferrand. He early attracted the attention of Descartes and others by his mathematical genius, displayed particularly in his *Geometry of Conics,* which appeared in 1639. Through his sister he became interested in the Jansenist faith, and in 1654 allied himself with the convent at Port Royal. In 1656-57 he wrote his *Provincial Letters,* directed against the Jesuits; these attacks were masterpieces of irony, though not always sound in scholarship. His *Thoughts* were published in 1670, and were supplemented with an *Apology for the Christian Religion* (a defense of Jansenism), which was never completed. Always faithful to his interest in the development of science, Pascal maintained, however, that the only perfect knowledge comes through Christian revelation. His *Thoughts* are a mixture of sophistry and expressions of great profundity, and reveal extraordinary intelligence. In physics he contributed a theorem which bears his name. This is properly known as Pascal's Law; it relates to the mechanics of fluids, and is as follows:

> Pressure exerted anywhere upon the surface of a liquid enclosed in a vessel is transmitted undiminished in all directions, and acts with equal force upon all equal surfaces, and at right angles to the surfaces.

With Fermat he also worked on the theory of probabilities. He was among the first to attempt a philosophy of mathematics.

PASHA, *pa shah'*, a title granted by the sultan of Turkey and by the khedive of Egypt

to such individuals as they wish to honor. In early times, when the word meant *Shah's foot,* that is, one who helped the Shah in governing, it was the title of the governor of a province, then called a *pashalik.* Since 1867 such territorial divisions have been called *vilayets*—of which there are thirty-seven in the Turkish Empire—and the governor is known as *Vali.* To this is added the now purely honorary title of pasha, so that his full title is *Vali pasha.* Anciently, an officer went before such an official, displaying a white horse's tail, reminiscent of the time when they were nomadic tribes. But some pashas had more power than others, a fact which was shown by displaying two or even three horse tails; hence there are three grades of this honor, though their symbols are no longer in use.

This title is now conferred on high government officials, both military and civil, and is also granted to distinguished private citizens, or even to foreigners who are in the Turkish government service. The title appears after the name.

PASSAIC, *pa sa' ik,* N. J., a manufacturing and residential city in Passaic County, twelve miles northwest of New York City and eight miles north of Newark. It is at the head of navigation on the Passaic River and is served by the Erie, the Delaware, Lackawanna & Western and the New York, Susquehanna & Western railroads, and by electric interurban lines. The population in 1910 was 54,773; in 1920 it was 63,824 (16 per cent gain.) Slightly more than fifty per cent of the inhabitants are foreign born, and these include Austrians, Hungarians, Russians, Italians and Germans. The area of the city exceeds three square miles.

The city has an attractive residence section and several parks, and contains the city hall, a fine public library, churches and hospitals. Power for manufacture is supplied by the river. Factory products include woolen and worsted cloth, cotton goods, silk, rubber, metal work, leather and other commodities, and there are chemical works, tanneries and packing plants.

Passaic, known as Aquackanonk Landing until 1852, was settled about 1676, was incorporated as a village in 1869 and became a city in 1875. The commission form of government was adopted in 1911.

PASSENGER PIGEON, *pas' en jer pij' un,* a wild pigeon, about fifteen inches in length, with delicately-tinted plumage and long, graceful wings and tail, found in large numbers in Eastern North America until the latter part of the nineteenth century. Through the activity of hunters the beautiful passenger pigeon is now practically extinct.

The accounts of early bird students concerning the numbers of these pigeons seem almost incredible. Wilson, in 1808, estimated that a flock which he observed in Kentucky contained more than two and a quarter billion birds, and Audubon, in 1813, wrote that he watched passenger pigeons pass for three days in succession in a flock so dense and continuous that the sun was darkened and the sound of their wings was like thunder. Their nesting colonies covered thousands of acres, which they practically desolated, every large tree in the nesting area being loaded with dozens of nests. The birds were strong fliers and ranged daily as far as a hundred miles in search of food.

PASSION, *pash' un,* FLOWER, a name applied by early Roman Catholic missionaries in America to a group of climbing plants, whose parts, they fancied, represented Christ's passion, or suffering. For example, the fringes in the flower they thought were symbolic of the crown of thorns; the five anthers, of the marks of His wounds. The divisions of the pistil represented the nails of the cross, and the stamens, the hammers that drove them in. The species of the passion flower genus are found chiefly in the tropical and semitropical regions of America. Among them is the familiar passion flower of the Southern states, a woody vine which trails or climbs by tendrils. Its natural habitat is dry soil in the states from Virginia to Florida, and west to Texas, but it is cultivated in the North, where it is esteemed as an arbor or veranda covering. In the Southern cotton fields it is sometimes a troublesome weed. The large, purplish and white flowers have a bell-shaped calyx, with five divisions; within the five petals is a crown of purplish hairs, or bristles, forming a fringe. The fruit, an oblong berry which turns yellow when ripe, is called *Maypop,* and is good to eat.

Another species, which grows in moist thickets in Pennsylvania and southward, bears greenish-yellow flowers and a smaller berry. A Brazilian passion flower is widely cultivated in Northern greenhouses for its beautiful blossoms, which are pale blue, white or rose-colored. This plant will grow in the open as far north as Washington, D. C.

PASSION PLAY, an impressive dramatic performance, representing the passion and death of Christ, given regularly at Oberammergau in Bavaria, every ten years. It is not a survival

of the type of mystery plays that were popular in Northern France, Italy, England and Germany in the Middle Ages, and subsequently repressed; it is the outcome of a vow made by the villagers in 1633 to commemorate the passion of Christ, in gratitude for their deliverance from a plague then raging in the vicinity. This vow has been kept and the performance has regularly taken place, attracting thousands of visitors from all parts of the world.

ANTON LANG
The *Christus* of the Passion Play of 1910 and 1922.

The play has dramatic and artistic merits. At each performance about 600 persons, all residents of the village of Oberammergau, take part, making the play very impressive. The latest presentation was in 1922. Because the passions of the world were yet inflamed no performance was given in 1920.

PASS'OVER, a feast held in Jewish families at the time of the first full moon of spring, on the fourteenth day of Nisan, the first month of the sacred year. It commemorates the sparing of the Hebrews on the eve of the Exodus from Egypt, when God smote the first-born in every Egyptian home but *passed over* the Israelite houses, whose doors had been marked by the blood of a lamb. It is celebrated by the eating of a lamb, killed with priestly rites, with unleavened bread. At the beginning of the feast, the eldest son begins the ceremony by reverently asking its meaning, and the father relates the story of the first passover. The feast ends with the singing of psalms. In the Christian Church, the passover is replaced by the Lord's Supper (*Luke* XXII, 17-21), and Jesus is regarded as the sacrifice foreshadowed by the paschal lamb. Paul writes, "For our passover also hath been sacrificed, even Christ" (*I Corinthians* V, 7).

Consult Dembitz's *The Jewish Services in Synagogue and Home.*

PASS'PORT. An official document granted by the authority of a nation to one of its citizens or subjects to enable him to travel in foreign lands. It certifies to his citizenship and requests for him safe passage and all lawful aid and protection while in foreign nations. In most nations and for most purposes such a document is not at all necessary, but in a few countries, notably Russia and Germany, it is still an essential. In the United States, the only official authorized to issue a passport is the Secretary of State. It will be granted as a matter of right, except in time of war, to any citizen, whether native born or naturalized, who makes proper application, which must be in the form of a written affidavit, stating the fact of his citizenship and giving his legal residence. It must contain a description of his person, and be accompanied by a certificate from at least one credible witness that the facts mentioned are true; it must be attested by an official authorized to administer oaths, and the applicant must take the oath of allegiance to the United States. The fee that must accompany the application is ten dollars. A passport is good for two years from date of issue.

In Canada passports are issued by an undersecretary of the London Foreign Office, resident in Ottawa. This latter office corresponds to the State Department in the United States.

PASTEUR, *pas tuhr'*, Louis (1822-1895), a French chemist whose researches and discoveries in the field of bacteriology have made him one of the world's greatest benefactors. He was born at Dôle, France, in the Jura district. At the age of twenty he began the study of chemistry at the Ecole Normale in Paris, later specializing in that subject at the Sorbonne. In 1867 he was appointed professor of chemistry in the Sorbonne, and in 1888, when his labors were crowned by the dedication of the Pasteur Institute, he became director of that great center of research.

LOUIS PASTEUR
Best known to the average citizen as the organizer of Pasteur Institutes for the cure of hydrophobia and lockjaw (tetanus).

It would be difficult to overestimate Pasteur's services to mankind. His study of the process of fermentation and of the diseases that affect spirituous and malt liquors resulted in improvements in brewing, distilling and wine making that saved France more than enough to pay the huge indemnity incurred by the Franco-German War, and he saved the silk in-

dustry of the country by discovering the parasite that was causing the ruinous silkworm disease. He laid the foundation for the isolation of the germs of tuberculosis, cholera, diphtheria, lockjaw and other infectious diseases, he discovered the method of checking hydrophobia by inoculation, and he showed how anthrax in cattle and sheep, fowl cholera and similar diseases of animals could be prevented or conquered. The process of arresting fermentation in milk, known as pasteurizing (see MILK), is another result of his labors, and has been the means of saving the lives of many children. Pasteur also made valuable contributions to antiseptic surgery. In brief, he helped to make the world a better and a safer place of habitation, both for human beings and for animals.

The Pasteur Institute, where research work in bacteriology is constantly carried on, has been called the "world's greatest life-saving institution." The Rockefeller Institute for medical research, in the United States, is similar in methods and purpose.

See BACTERIA AND BACTERIOLOGY; DISEASE, and lists of related subjects in connection with those subjects. Consult Herter's *The Influence of Pasteur on Medical Science.*

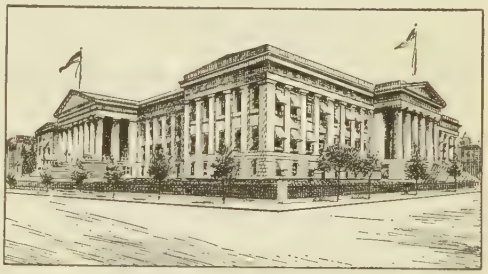
PAS'TORAL POETRY, in general, is any poetry which treats of country life; more specifically, an artificial form which uses shepherds and shepherdesses as its characters, a rural setting, and love as its theme, but which in reality portrays the ideas, the feelings, and even the happenings of life on a higher plane. Almost invariably it has flourished when life was especially corrupt, or at least artificial. Among the Greeks pastoral poems were known as idyls, and were most successfully attempted by Theocritus. Vergil's *Eclogues,* the most famous of Latin pastorals, have little of the true nature spirit about them, and the same may be said of the poems of Horace, Catullus and the other Roman poets.

In England, the first pastoral of note was Spenser's *Shepherd's Calendar,* which appeared in 1579, and in the next twenty-five years no other theme was so common in English literature as the more or less artificial longing for rural simplicity. Marlowe wrote the *Passionate Shepherd,* Sidney the *Arcadia,* Ben Jonson *The Sad Shepherd* and Shakespeare *As You Like It.* Milton's *Comus* and *Lycidas,* the one a masque, the other an elegy, have both the pastoral setting. Pope's pastoral poetry is thoroughly conventional, but such later poets as Cowper, Burns, Shelley and Tennyson show in their work the true love and understanding of nature.

PATAGO'NIA, a geographic term formerly applied to that portion of South America lying south of the thirty-eighth parallel. The region was discovered and named by Magellan in 1520 and was left unclaimed until 1881 when by treaty it was divided between Chile and Argentina. The name has now no political significance. The portion of land west of the Andes is the Chilean territory of Magallanes; that on the east side of the mountains constitutes the Argentine territories of Rio Negro, Chubut and Santa Cruz. The Chilean section of what was Patagonia contains the southernmost city in the world—Punta Arenas. It has a population of 12,200. See CHILE; ARGENTINA.

Consult Pritchard's *Through the Heart of Patagonia;* Willis's *Northern Patagonia.*

PAT'ENT, an official document, issued by national authority, securing to one who has perfected an invention exclusive control of the same, both as to manufacture and sale, for a limited number of years. Since no such right



UNITED STATES PATENT OFFICE
Washington, D. C.

existed under the common law, it is only issued in conformity with statutory regulations.

In the United States, the Constitution places patents under the control of Congress, and as early as 1790 the first act governing the granting of patents was passed. Changes were made in the regulations from time to time, until 1870, when the various measures concerning patents were revised; since that date comparatively few changes have been made.

A patent can be issued only for an invention, a new mechanical development or discovery, but not all such discoveries are patentable. A scholar who discovers a new element, like radium, cannot possibly secure a patent on it. To be entitled to a patent a person must have invented or discovered some new and useful art, machine, manufacture or composition of

matter; or some new and useful improvement of the same. Every one of these words has been carefully defined by court rulings. A machine is not new simply because it differs in size or shape from another similar mechanism, or because it presents a different arrangement of parts of an old machine. Some new *principle* must have been introduced to make it patentable. It must be useful, but a child's toy can be as readily patented as a steam engine.

It must be an invention, but every little improvement is not an invention. It will not be granted for such an alteration in device as would naturally and spontaneously occur to any skilled mechanic or operator. An invention means the finding out, the contriving, the creation of something that did not previously exist. Originality is the test of inventions. Whether an invention is the result of a fortunate discovery, or comes as the reward of years of careful experiments, is immaterial; patents will be granted as readily in the one case as in the other. Novelty and utility must go hand in hand to constitute a patentable invention. These are only a few of the many points that must be considered by the Patent Office before determining whether a patent shall be issued or denied.

When a person desires a patent, specifications must be prepared stating clearly the nature of the invention and setting forth what he claims as new. This last is extremely important. Whenever possible a drawing of the invention must accompany the specifications, and sometimes a working model is required. The specifications and drawings must be signed by the applicant and attested by two witnesses. Appended to the specifications, there must be an affidavit from the applicant setting forth the fact that he believes himself to be the original inventor. Accompanying these papers must be a writing in the form of a petition to the Commissioner of Patents, stating the general nature of his invention and the object of his application.

When such papers reach the Patent Office, they are carefully examined by an expert. All the points mentioned above will be considered; the claims set forth will be scrutinized; search will be made in the archives to see if the invention in any way conflicts with previous inventions, or if there is a patent pending for an invention containing the same principle. This examination may end in the rejection of the application. In such a case the specifications and claims may be amended, and a second examination may be requested. If still rejected, appeals may be taken, first to the official board of examiners, next to the Commissioner of Patents, then to the Court of Appeals of the District of Columbia.

If the patent is granted, the inventor has a monopoly on his invention for seventeen years; formerly there was a like renewal period. The necessary fees are $15, which must accompany the application, and $20 additional when the patent is issued. The fee for a reissued patent was $30. It occasionally happens that by reason of mistakes in specifications or claims a defective patent has been granted. In such cases, the original patent may be surrendered and a new one applied for.

The total number of patents issued in the civilized world has reached enormous proportions. In the United States alone 40,000 patents were issued in 1920, nearly eight times as many as were issued by the rest of the world. The total number of patents issued by the United States at the close of 1871 was 120,573; this number had increased to exactly 1,000,000 on August 8, 1911. It had required 120 years to reach the million mark, but at the present rate of application the second million patents in the United States will be granted within a period covering only about thirty years.

Canada had issued 4,081 patents at the close of 1870, and from that time to 1920 had granted about 150,000, showing a remarkable increase. See COPYRIGHT; TRADE-MARK. C.H.H.

Consult Macomber's *Fixed Laws of Patents;* Singer's *Patent and Trade Mark Laws of the World.*

PATERSON, WILLIAM (1839-1914), a Canadian statesman, Minister of Customs from 1897 to 1911, and for forty years one of the leading members of the Liberal party. He was born and educated at Hamilton, Ont., where also he later engaged in business and became a successful manufacturer. In 1872, having in the meantime removed to Brantford, he was elected mayor of the latter city, and in 1873 was elected to the Dominion House of Commons. His interest and ability in financial affairs soon made him a conspicuous figure. In 1896 he was appointed controller of customs, and in the following year, when that department was raised to the rank of a Ministry, was appointed first Dominion Minister of Customs.

This position he filled with distinction until the fall of the Laurier Ministry in 1911. He was on several occasions acting Minister of Finance, took a prominent part in framing the tariff laws of 1877 and 1907, was a delegate to

the Colonial Conference at London in 1902 and later was special trade commissioner to consider the relations between Canada and the West Indies. In 1911 he assisted William Stevens Fielding in negotiating the Taft-Fielding reciprocity treaty with the United States. The fall of the Laurier government, which had appealed to the people to endorse the treaty, was followed by Paterson's retirement to private life.

PAT'ERSON, N. J., the county seat of Passaic County, the third largest city in the state, ranking next to Newark and Jersey City, and an important manufacturing center. It is sixteen miles northwest of New York City, twelve miles north of Newark, and on the Passaic River and the Delaware, Lackawanna & Western, the Erie and the New York, Susquehanna & Western railroads and interurban lines. In 1910 the population was 125,600; in 1920 it was 135,866 (8 per cent gain). Paterson is compactly built, its area being but little more than eight square miles.

The Passaic River at this point descends nearly seventy feet, fifty feet in a single fall, a circumstance which led to the selection of this site for the establishment of a manufacturing community. Alexander Hamilton, interested in effecting the commercial independence of the United States from Europe, was one of the organizers of the "Society for the Establishing of Useful Manufactures." In 1791 this society secured a charter and founded the city of Paterson. The first plants—cotton mills and paper mills—have gradually been replaced by other establishments. In 350 plants, making silk of every kind, is manufactured more silk than in any other city of the United States. Over 25,000 operatives are employed in this industry and $50,000,000 is the approximate value of the annual output. Other important manufactures are locomotives, machinery, shirts, twine, thread and rugs. The total annual value of manufactured products is about $70,000,000 in favorable years.

Prominent features of the city are the Federal building, the county courthouse, city hall, public library, Y. M. C. A. and Y. W. C. A. buildings, the Elks' Home and the high school building. Eastside Park (forty-eight acres) and Westside Park (forty-five acres) are along the river at opposite sides of the city. Among the leading institutions are the General and Saint Joseph's hospitals, a children's day nursery, orphan asylums and an Old Ladies' Home, all except the first supported by contributions.

Founded in 1791, Paterson was incorporated as a city in 1851. In 1907 the commission form of government was adopted. The city was rapidly rebuilt after a fire and flood in 1902. J.M.F.

PATHOLOGY, *pa thol'o ji,* a term derived from two Greek words meaning *science of disease.* Pathology may be defined as the science which treats of the modifications in function and the changes in structure produced in any part or organ of the human body by disease. See the article DISEASE and appended list of related subjects.

Consult Adami and McCrea's *A Textbook of Pathology;* Delafield and Pruden's *Pathological Anatomy and Histology.*

PAT'MOS, a volcanic island in the Mediterranean Sea, off the coast of Asia Minor, about ten miles long and six miles broad, belonging to Turkey. Its only claim to fame rests on its mention in the Bible as the island to which Saint John was banished and where he received the visions described in the book of *Revelation.* The island is bare and rocky, and the inhabitants are chiefly occupied in fishing. The skill of the islanders as sailors is proverbial.

A monastery dedicated to the memory of Saint John was established on Patmos in 1088, which flourished for centuries. The library possessed many valuable manuscripts, which have nearly all been sold. The population is about 4,000. Conditions on the island under Turkish rule have steadily grown worse, and Patmos is far from flourishing.

PATNA, *put'na,* the chief city and capital of a division of the same name in British India. It is situated in the district of Bengal, on the right bank of the Ganges River, 332 miles northwest of Calcutta, and in commercial importance ranks next to the latter among the cities of Bengal. Its opium factories are the largest in India, and it is known also for its bazars and a thriving trade in indigo. It is served by the chief railway of the valley of the Ganges. The majority of the inhabitants are Hindus, but there are about 40,000 Mohammedans and a small number of Christians. The population, in 1921, was 120,109.

Patna, including the suburbs, extends along the river bank for nine miles. It has narrow, crooked streets and few buildings of note except the Roman Catholic cathedral and the government offices and college. It is an old community, having flourished under the name of Lotus City four centuries before Christ. The British took possession of the district in 1763, as a result of a quarrel between the native

government and the servants of the East India Company.

PATRIARCH, *pa'tri ark,* in ancient times the father or ruler of a family or tribe. The term was applied in Hebrew history especially to Abraham, Isaac, Jacob and the heads of the Twelve Tribes. All the descendants of a patriarch were subject to his rule, and on his death he was succeeded by his eldest son. In later Jewish history the president of the Sanhedrin, a council vested with civil and religious authority in Judea and Syria, was called patriarch. The term was carried over to the Christian Church, which applied it to the early bishops. About the fifth century the use of the title became restricted to the bishops of Rome, Constantinople, Antioch and Jerusalem. The patriarch of Rome became later the Pope of the Roman Catholic Church.

PATRICIAN, *pa trish'an,* a word derived from the Latin *pater* meaning *father.* The original *populus Romanus* (Roman people) consisted of a number of clans, or *gentes,* as they were called, and comprised all the free citizens of the state. Gradually, however, a new class grew up, composed of the members of the conquered tribes who had been brought to Rome and the descendants of marriages between the free citizens and their clients. To this second class the name *plebeians* was given, while the descendants of the original *gentes* were distinguished with the title of *patricians.* The early history of the republic is largely a history of the struggle between these two classes. In the beginning the patricians possessed all the political and judicial power; at the close of the struggle there was a perfect equality, and the term patrician conferred no superiority except such respect as might naturally be accorded those of high birth. See PLEBEIANS.

PATRICK, *pat'rik,* SAINT (373-463), the patron saint of Ireland, whose feast day, the 17th of March, is celebrated as "Saint Patrick's Day" in every part of the world to which the Irish have penetrated. This best-known of all the saints was born in Scotland, near the modern Dumbarton, and at his baptism was given the name of Succath. His life seems to readers of modern times most romantic and adventurous. At the age of sixteen he was captured by pirates from Ireland and carried to that island, where for six years he tended the flocks of an Ulster chieftain. During these years of his slavery he became a devoted Christian, and after his escape to France entered monastic life. Directed by a vision to return as a missionary to Ireland, he obeyed the call in 432, and for the rest of his life worked zealously in various parts of the island. His labors were miraculously successful; the statement may be accounted almost literally true that he "found Ireland all heathen and left it all Christian," for he founded over 300 churches and personally baptized over 12,000 people.

Naturally many legends grew up about the name of this popular saint, the best known of all being the one which represents him as charming the snakes of Ireland by his music so that they followed him to the seashores, where they were driven into the water and drowned. Indeed, most that is told about Saint Patrick is little more than legendary, for though he left an autobiography, or *Confession,* written in crude Latin, this places the emphasis on his work and not on his life. Many relics of this venerable man were held sacred for a thousand years, when in the Reformation some were destroyed. At least one, his bell, is said yet to be preserved in the Museum of Arts and Sciences in Dublin. Much study has been bestowed upon him, but even the facts outlined above are by no means accepted without controversy. A.MC C.

Consult Todd's *Saint Patrick, the Apostle of Ireland;* Cusack's *Life of Saint Patrick.*

PATRIOTISM, *pa'tri ot iz'm.* "It is sweet and glorious to die for one's country," runs the familiar line from a poem of Horace. This Roman poet lived in the first century before the birth of Christ, but in that far-off period of the world's history patriotism was not a new thing. The Romans of that time were telling to their children the story of Regulus, who, two centuries before, had heroically advised his countrymen not to make peace with Carthage and then had returned to the land of the enemy to suffer death by torture. Farther back than that—nearly 500 years before the Christian Era—a noble band of Spartans had held the pass at Thermopylae and died to a man, to save Greece and a new civilization from Persian despotism. Love of country has never been confined to one people or to one era. It is a universal feeling of the human heart, and one of the noblest to which humanity is heir.

The Basis of Patriotism. What is the underlying sentiment that makes men patriots? It is the conviction that life itself—the most precious gift of Providence—is of secondary importance to the life of the nation. As an American poet has written—

Life, for my country and the cause of freedom,
Is but a trifle for a worm to part with.

Shakespeare makes one of his characters say—

I do love
My country's good with a respect more tender,
More holy and profound, than mine own life.

The Swiss patriot, Arnold Winkelried, so measured the value of his life when he rushed into the ranks of the Austrians at the Battle of Sempach, and "made way for liberty." Such, too, was the spirit of Nathan Hale, whose dying utterance, "I only regret that I have but one life to lose for my country," expresses the feeling of true patriots of all lands and ages.

A Living Patriotism. This spirit of loyalty and self-sacrifice animates all of those who practice patriotism in everyday life. There is no finer quality of love for country than that which inspires men and women to be good citizens; such a patriotism makes them sacrifice leisure and pleasure and money and personal preferences to serve the state. It makes voting and intelligent study of the problems of the day a sacred duty. To the right-minded person

There are no points of the compass on the chart of true patriotism.

Cultivating Patriotism. The spirit of patriotism should be fostered in the hearts of children both at home and in the schoolroom. They should have access to books and magazines which will instill noble ideals and inspire to heroic living. Moreover, the teachers and parents themselves should at all times set an example of patriotic devotion. The boy who sees his father neglectful of his duties as a citizen and his mother indifferent to the great questions pertaining to national life is not being encouraged to love his country better than his life. Teachers should find in the teaching of such subjects as history, civics and literature opportunities for fostering patriotic sentiments, and they should prepare special programs on the anniversaries of great historic events. Every pupil should know the words of his country's national hymns and know how to salute its flag. In such ways teachers may help develop in the young one of the finest of all the virtues. B.M.W.

Outline on Patriotism

Motto:

"Let our object be our country, our whole country, and nothing but our country."—Daniel Webster.

Essay on Patriotism:

(a) What is patriotism?
(b) Some patriots of past history
(c) Patriots of to-day
(d) How can I best practice patriotism?

Biography:

Robert Bruce	Joan of Arc
Demosthenes	Thaddeus Kosciusko
Benjamin Franklin	Horatio Nelson
Nathan Hale	Laura Secord

Poems:

Paul Revere's Ride—Longfellow
My Native Land—Coles
Marco Bozzaris—Halleck
Your Flag and My Flag—Nesbit

Quotations:

How sleep the brave, who sink to rest,
By all their country's wishes blest.
—Collins.

My country, 'tis of thee,
Sweet land of liberty,—
Of thee I sing. —Samuel F. Smith.

Breathes there a man with soul so dead
Who never to himself hath said,
This is my own my native land!
—Scott.

Land of my sires! what mortal hand
Can e'er untie the filial band
That knits me to thy rugged strand!
—Scott.

Our country, to be cherished in all our hearts, to be defended by all our hands.—Winthrop.

What a pity is it
That we can die but once to save our country!
—Addison.

Supplementary Reading

Gettysburg Address—Lincoln
Man Without a Country—Edward Everett Hale
The Leak in the Dyke
Commemoration Ode—Lowell
Horatius at the Bridge—Macaulay

Related Subjects. Biographies of the following men and women conspicuous for patriotism are given in these volumes:

Adams, John	Kosciusko, Thaddeus
Adams, Samuel	Kossuth, Louis
Allen, Ethan	Lee, Richard Henry
Brock, Sir Isaac	Lincoln, Abraham
Bruce, Robert	Mazzini, Giuseppe
Brutus, Marcus Junius	Morris, Robert
Decatur, Stephen	Nelson, Horatio
Emmet, Robert	O'Connell, Daniel
Franklin, Benjamin	Revere, Paul
Hale, Nathan	Ross, Betsy
Hamilton, Alexander	Secord, Laura
Hancock, John	Tell, William
Henry, Patrick	Wallace, Sir William
Hofer, Andreas	Winkelried, Arnold

PATRONS, *pa'trunz,* **OF HUSBANDRY.** See GRANGE.

PATROON, *pa troon',* **SYSTEM,** a plan adopted by the Dutch West India Company for the colonization of New Netherland, in what is now New York state. The plan as first adopted permitted any member of the company to select as his own property any tract of land outside of Manhattan Island, extending sixteen miles along one side of a river or bay,

or eight miles along two sides, and as far back into the country as convenient, provided he should, within four years, establish there a colony of fifty persons over fifteen years of age. Later the tract of land could extend only four miles along a river bank or coast, and only eight miles inland. The period of settlement was shortened to three years, and the privileges of the system were granted to all desirable inhabitants of New Netherland. The system had many objectionable features, for the patroon, or proprietor, had about the same power as a feudal lord, and in time there developed in New York a typical landed aristocracy. The effects of the system were felt well into the nineteenth century; in 1844 an antirent rebellion, started by some of the tenants on the old patroon estates, was suppressed by military force.

PATTI, *pat'e,* Adelina Juana Maria (1843-), the most famous singer of the nineteenth century, and one of the greatest of any age, was born at Madrid, Spain. Her father was Italian, her mother, Spanish, and both were gifted with song. Her early childhood was spent in America and her first training in music was received in New York from her brother-in-law, Maurice Strakosch, formerly a well-known singer. When she was but seven years old she began to sing in the most prominent concert-halls of New York and when sixteen attracted unusual attention by her marvelous singing as Lucia in Donizetti's opera, *Lucia di Lammermoor.* Two years later she began to take leading operatic parts in London, and immediately was proclaimed by English critics as one of the world's greatest singers. Her work in France, Spain, Italy, Norway and Sweden was so successful that in many of the larger cities of those countries vast crowds of admirers followed her through the streets.

In 1868 she married the Marquis de Caux of France, but was divorced in 1885. Soon afterwards she married the famous tenor Nicolini, who died in 1898; in 1899 she married Baron Cederstrom of Sweden. In 1885 she bought a castle at Craig-y-Nos in Wales and there erected a private theater where from time to time she gave concerts not only for the wealthy and noted but for the Welsh peasants in the neighborhood. Her kindness to these humble people has made her one of the most beloved women in Great Britain, and many a poor Welsh family has gone to her for help or consolation in time of trouble. After 1890 Patti made no regular concert tours, but frequently filled special engagements in America and Great Britain, and sang in the United States as late as 1911. She wisely avoided the heavy rôles of Wagner's operas and therefore preserved her voice in much of its original beauty in old age.

PAUL, the name of five Popes of the Roman Catholic Church. Of these Paul I was least important. He was born in the year 767 and was the successor on the Papal throne of his brother, Stephen III. This Pope had the support of the temporal power, for Pepin, King of the Franks, gave him assistance in his struggle against the Lombards.

Paul II, Pope from 1464 to 1471, was a nephew of Pope Eugenius IV, by whom he was created a cardinal in 1440. On being elevated to the Papacy he began at once to try to unite the Christian kingdoms of Europe against the Turks, who were threatening to invade Italy. The most pronounced tendency of Paul II was his hostile attitude toward the Renaissance. He opposed the new learning, not because he objected to scholarliness as such, but because he feared that the introduction of the ancient Greek culture might mean a return of the pagan religion and pagan morals.

Paul III was born in Tuscany in 1468, and was made a cardinal by Alexander VI in 1493. In 1534 he was elected to the Papal chair, and in that high office continued the efforts at reform which had marked his previous administration as bishop of Ostia. In the interests of reform he several times tried to summon a council, which finally met at Trent in 1545, having been repeatedly postponed because of the constant struggle between Francis I of France and Emperor Charles V (see Trent, Council of). It was Paul III who excommunicated Henry VIII of England, and restored the Inquisition for the suppression of heresy. He also made Michelangelo chief architect of Saint Peter's. He died in 1549.

Paul IV, Pope from 1555 to 1559, became bishop of Chieti in 1507, archbishop of Brindisi in 1518, and in 1524 founded the Order of secular clergy which he called Theatines. He was seventy-nine years of age when he was made Pope, but he showed an unexpected vigor, acting on the reform principles which he had instituted in his earlier offices. He reorganized the Inquisition, established a censorship of books, bettered the conditions of the poorer classes and demanded a stricter administration of justice. Queen Elizabeth of England, who followed the Catholic Mary, was at her accession to the throne declared by him to be illegitimate.

Paul V, Pope from 1605 to 1621, was of the famous Borghese family, and was made a cardinal in 1596. The first two years of his Papacy were disturbed by a dispute with the Republic of Vienna. Paul demanded that ecclesiastics should not be brought to trial before other than ecclesiastical tribunals, and when the senate and the doge refused to submit, issued sentence of excommunication against them. Still they remained obdurate, and the controversy raged until 1607, actual recourse to arms being at times threatened; but a compromise was at last effected by Henry IV of France. Paul V was active in the suppression of heresy, the establishing of religious Orders and the promotion of the missionary movement. A. MC C.

For a list of all the Popes see the article POPE, in which is also a detailed account of the method of election to the Papal chair.

PAUL, SAINT (3-67), the great apostle to the Gentiles, and one of the chief agents of the early Church in establishing Christianity. Until his conversion he was called SAUL OF TARSUS, for his parents were prominent and influential Hebrews of that Cilician city. The boy was sent to Jerusalem to be educated under the learned Gamaliel, one of the most distinguished rabbis of the day, and there he was trained according to the strict Jewish faith and traditions. Since all boys in his nation were taught some trade, he learned how to make tents, and later, while preaching in various towns, he supported himself in this way.

As a young man Saul was made a member of the council at Jerusalem, and not long after Stephen, the first Christian martyr, was stoned to death, the high priest appointed him to take charge of the work of persecuting the new sect. It was while he was on his way to Damascus in the interest of this work that he experienced conversion—an event which changed the whole course of his life (see *Acts* IX). This happened when he was about thirty-two years old. Immediately, with characteristic energy, and to the astonishment of the Jews, he began to preach in the synagogues; his success in obtaining converts stirred to wrath the Jews and the governor of the city, so he was compelled to flee secretly.

After going to Arabia, Paul, as he then called himself, returned to his native city. There he stayed for several years, until his friend Barnabas urged him to begin work at the Church of Antioch in Syria. For a year these two men labored among the Gentiles who had formed this new Church, obtaining many converts and placing their organization upon a firm basis. To the disciples in Antioch the name Christian was first given.

Missionary Journeys. This was the starting point in Paul's work of evangelizing the pagan world, for in the following year, A. D. 46, the Church which he had aided sent him out with Barnabas on the first of his three missionary journeys. These men worked their way north, founding churches in the principal cities until they reached Antioch in Pisidia, the chief city of the Roman province of Galatia. There, upon the invitation of the rulers of the synagogue, Paul made the great address recorded in *Acts* XIII, 16-41. As the chief people of the city were aroused against the Christians by the Jews, Paul and Barnabas were driven away; they then returned over their old route to place upon a firm basis the new churches which they had established.

Five years after the first journey Paul started out on a second trip, taking several followers with him. He visited both Phrygia and Galatia, then went over into Macedonia. On this expedition he founded the Church at Philippi, and so established Christianity in Europe. While preaching in Philippi he discovered that there was a decided advantage in being born a Roman citizen, for when the magistrates who had cast him into prison with Silas discovered his citizenship they immediately freed him and his companion, asking them to leave the city. The apostle and his followers then turned south, going down into Greece, where Paul delivered an address before the philosophers of Athens on Mars Hill (which see).

In A. D. 54 Paul started out on his third and last missionary journey. Passing through Phrygia and Galatia, he arrived at Ephesus, the capital of Ionia and one of the most influential cities of the East. For three years he made it the center of his operations, with great success.

Later Years. Then, in spite of warnings, Paul returned to Jerusalem. There he would have been seized by the mob had not Lysias, the commander of the Roman garrison, carried him off as a prisoner to the castle. Later he was sent to Felix, the procurator, to be tried in Caesarea, but he was still in prison two years later when Festus came into power. When Festus, willing to please the Jews, asked him to go to Jerusalem for trial, Paul availed himself of his right as a Roman citizen and appealed to Caesar. So he was sent to Rome, after making a notable defense before Agrippa (*Acts* XXVI,

1-23). There he was kept in confinement for two years more, although his friends were allowed to visit him. They labored for his release, which was probably obtained, for there are later accounts of his work in Asia and in Macedonia. According to tradition he was again arrested and was beheaded, probably as a result of the persecution against the Christians begun by Nero.

Paul's Epistles. These were letters to his friends and various churches; they form a considerable part of the New Testament. On his second missionary journey he wrote *First* and *Second Thessalonians;* on the third trip he wrote *Galatians, First* and *Second Corinthians* and *Romans,* and while in Rome in prison, *Colossians, Philemon, Ephesians* and *Philippians.* After his release he wrote *Titus* and *First* and *Second Timothy. Second Corinthians* describes his own life more completely than any other book, for most of the Epistles deal with the truths of Christianity and its application to life. The most important of the Epistles are treated in these volumes under the proper heading. E.C.

Consult Ramsey's *The Teaching of Saint Paul in Terms of the Present Day.*

PAUL I (1754-1801), an Emperor of Russia, son of Peter III and Catharine the Great. His mother treated him with neglect and even cruelty, and planned to exclude him from the succession, and to her behavior toward him many of his faults of character were doubtless due. He became emperor on the death of his mother in 1796, and almost from the first proved himself a despot of the most extreme type. Some authorities, indeed, do not hesitate to call him a madman.

He established spies everywhere, and subjected to the utmost brutality anyone against whom his suspicions were aroused. Entering the struggle against France when it was torn with the Revolution, he sent out several armies, one of which won signal victories in Italy; but he became angry with England because the Island of Malta was not surrendered to him, and with Sweden and Denmark formed a league against England. In 1801, a plot was made to force him to abdicate in favor of his son, Alexander I, and when he refused to accede promptly to the demands of the group of drunken officers who headed the conspiracy, he was strangled.

PAULISTS, *pawl'ists,* the familiar name of an Order of Roman Catholic priests, properly called *The Congregation of Missionary Priests of Saint Paul, the Apostle.* It was founded in New York City in 1858 by the Rev. Isaac Thomas Hecker, and is the only religious Order which originated in America. Organized for missionary work in the United States, the Paulists direct their efforts toward propagating their faith among non-Catholics. The churches of this Order, especially those of New York City and Chicago, are noted for their excellent boy choirs, that of the latter city having received recognition and applause in all the large cities of the United States and in Europe. It is second only to the famous boy choir of the Vatican.

PAUNCEFOTE, *pawns'foot,* JULIAN, First Baron (1828-1902), an English statesman, connected somewhat intimately with English and American diplomatic relations for many years. He was born at Munich, of English parents, was educated in Paris and Geneva, and in 1852 was called to the bar. After practicing law in Hongkong and serving as attorney-general there, he became in 1873 chief justice of the Leeward Islands. Returning to England in the next year he was made assistant under-secretary for the colonies and two years later for the foreign office. In 1882 he was made permanent under-secretary of state for foreign affairs, and in 1885 was a delegate to the Suez Canal Commission at Paris.

In 1889 he became minister to the United States, and during his term of office, in 1893, the title was changed from minister to ambassador. The Bering Sea controversy, the Venezuela affair and the revisions of the Clayton-Bulwer Treaty known as the Hay-Pauncefote Treaty were among the problems with which he was called upon to deal during his thirteen years' stay at Washington. When the Hague Conference was called in 1899, Pauncefote attended as senior British delegate, and he was largely instrumental in having the permanent Court of Arbitration established. It was for this last achievement that he was created Baron Pauncefote of Preston.

PAUPERISM, *paw'per iz'm.* Legally, a pauper is a person who is in such a state of poverty that he must depend upon public or private charity for support. There are many families which are compelled to ask for help under stress of unusual conditions—sickness of the chief breadwinner, scarcity of employment, etc.—but such families are not pauperized by accepting occasional charity. Pauperism may be defined as a condition of permanent or chronic destitution. Its causes and remedies

are subjects of earnest study by modern social workers. Pauperism can exist only when the agencies for the prevention of relief of poverty are inadequate to the situation. Poverty results chiefly from improvident methods of living (indulgence in drink, extravagance, etc.), misfortune (sickness, accident, loss of sight or hearing, death of the breadwinner, etc.) and old age; and the final result of the imperfect handling of these conditions is pauperism.

Under the heading CHARITY, in these volumes, will be found a discussion of the methods employed in modern times to alleviate the conditions of the poor. Old age pensions, juvenile courts and social settlements are all important agencies of relief, and all operate against the increase of pauperism. Each of these is described under its proper heading.

Consult Devine's *Misery and Its Causes;* Webb's *The Prevention of Destitution.*

PAVE'MENT, a hard, durable covering applied to a road or pathway, to afford easier transportation for heavy loads or for pleasure vehicles. A description of the various kinds of pavements is given in the article ROADS AND STREETS (which see).

PAVIA, *pah ve'ah,* the seat of one of the oldest universities in Europe, is a city of Northern Italy. In the days of the ancient Romans it was known as TICINO, and it was a place of considerable importance under the early Roman emperors. With the rest of Italy it shared in the wars and disturbances of the Middle Ages, and during Napoleon's invasion of the country was assaulted and plundered (1796).

Modern Pavia is the capital of the province of Pavia. It is situated on the Ticino River, two miles above the point where that stream joins the Po, and eighteen miles south of Milan. The suburb of Ticino, across the river, is connected with the larger city by a covered granite bridge built in the fourteenth century, and by a modern iron railway bridge. The visitor in Pavia would probably be impressed by its many interesting churches; the oldest of these, the foundations of which were laid in the eleventh century, is the Church of San Michele. In a beautiful chapel of the cathedral Church of San Martino is a sarcophagus containing the ashes of Saint Augustine, and north of the city is the finest monastery in the world, the Certosa di Pavia.

The University of Pavia, the outgrowth of a law school that was founded before the twelfth century, has an enrolment of over 1,600 in normal years. There are several other educational institutions, a museum of paintings and antiquities and several interesting monuments and statues. The place is still surrounded by its ancient walls, and has the general aspect of a city of olden times. Its medieval castle is now used as a barracks. Industrially, Pavia is known for its manufactures of machinery, chemicals, leather and organs, and for its trade in wines, silk, oil and cheese. Population of city in 1915, 40,729.

PAWN'BROKER. In every large city there are people engaged in loaning small sums of money on articles of clothing, watches, jewelry and other personal effects that are left with them as security. Such a man is a *pawnbroker,* and the articles left with him are *pawned.* If the person receiving the loan does not repay it with interest within a specified time after the debt becomes due, the pawnbroker has the right to sell the article left with him.

When properly conducted pawnbroking is a lawful business, and it is beneficial to people with limited means who cannot borrow money at a bank on the security they are able to give. But until very recently all pawnbroker's offices were private enterprises, and many abuses arose, such as charging exorbitant rates of interest, failing to credit the borrower with amounts paid on his loan, and finally selling the article pawned when the loan had been more than paid. In large cities there were always some unscrupulous pawnbrokers who would receive stolen goods, knowing them to be such, and sell them at a large profit. These abuses became so general that legislation regulating pawnbroking has been enacted in every state in the Union and in the Canadian provinces. In some states cities are allowed to regulate the business by city ordinance, but in most cases the state law prevails, assuring uniform practice.

In general, these regulations require the pawnbroker to keep a record book in which every article received is described, and to submit this book on demand to the police or other officers having authority to demand it. They are not allowed to receive goods from one under the influence of drink nor under a specified age, nor to sell the goods until after the expiration of the time for their redemption. On account of the expense incurred in making small loans, a high rate of interest is usually allowed, but this is usually limited to one per cent a month. In Illinois a state pawnbroker association was formed in 1898, and it opened offices in Chicago. The association does a legitimate business and pays the stockholders a good rate

of interest. In New York there is a society with a capital of over $500,000, which is also a financial success. These and other similar societies show that pawnbroking can be carried on in a lawful manner and be financially successful. Nevertheless, one compelled to borrow money should look upon this means of making a loan as a last resort.

Consult Levine's *A Treatise on the Law of Pawnbroking;* by the same author, *The Business of Pawnbroking.*

PAWNEE, *paw ne',* a tribe of North American Indians belonging to the Caddoan stock. The name, which is a native word meaning *horn,* was given them because of the hornlike scalping lock which they wore, arranged in such a manner as to stand upright. Their home formerly was along the banks of the Platte River in Nebraska. They raised grain and vegetables, and built permanent homes of logs and earth. During an epidemic of smallpox in 1838 over 2,000 members of the tribe died. In 1833 they ceded their territory south of the Platte River, and in 1858 gave up all their remaining land except a small strip along the Loup River, on which they remained until 1874. Then they removed to a reservation in Indian Territory (now Oklahoma), where they now live. The tribe numbers not more than 600.

PAWPAW, a small tree or shrub belonging to the custard apple family, which produces a fruit, also called pawpaw, that looks somewhat like the banana. The plant is distributed through the Southern United States, and is

THE PAWPAW
(*a*) Flower; (*b*) fruit.

found as far north as Kansas, Michigan, New Jersey and Western New York. Its leaves spread out in umbrellalike whorls, as do those of some species of magnolia, suggesting the relationship of the tree to certain tropical species. The pawpaw grows to a height of from twenty to thirty feet and bears a fruit from three to five inches long, covered with a wrinkled brown skin. The yellow pulp is soft and sweet, but has not enough taste to make it popular as a table fruit. The wood of the trees is too soft and coarse to be of value, but its thin, fibrous bark is utilized in making fish nets.

A tree of the passion flower family, called the *melon pawpaw,* grows wild in southern Florida. Its habits of growth are similar to those of the palm, for its leaves are grouped, rosette fashion, at the top of a tall stem. The fruit of the melon pawpaw resembles the cantaloupe in appearance and is eaten raw or made into conserves.

PAWTUCKET, *paw tuk'et,* R. I., one of the most important cotton-manufacturing centers in the United States, a city of Providence County, situated in the northern part of the state, at the head of navigation of the Pawtucket River. Providence, the state capital, is four miles south. In Pawtucket, in 1790, cotton weaving by the factory system was introduced into the United States, and here in the same year cotton thread was first manufactured by Samuel Slater. The city has the service of the New York, New Haven & Hartford Railroad, and of the electric lines which extend in various directions to adjacent cities and towns. The population increased from 51,622 in 1910 to 64,248 in 1920 (25 per cent gain). The area of the city is about nine square miles.

Industry. The Pawtucket River divides the city into two sections and has a fall here of about fifty feet, which not only contributes to the scenic charm of the locality but furnishes immense water power, which has been an important factor in the development of the city. The first mill erected here was a water-frame mill which manufactured the cotton warp used by hand weavers in making sheeting, ginghams, calicoes, etc.; then followed weaving by machinery, and now this industry is conducted on the largest scale, many million yards of cotton fabrics being annually made by one firm alone. The kindred industries of bleaching and dyeing are also extensive. While the cotton-textile industry is preëminent in Pawtucket, there were 284 factories of all kinds in 1920, capitalized at $104,856,000. The value of the products in that year of abnormally high prices was $135,518,000. The commercial value of the river has been increased by the improvements made in the channel by the United States government. Lumber, cement, coal and

manufactured products are the chief articles of trade.

Buildings and Institutions. Among the noteworthy buildings are the Sayles Memorial Library, state armory, Memorial Hospital, the Home for the Aged Poor and several fine bank and business buildings. Besides a large number of private, public, industrial and business schools, and a public library, Pawtucket has the advantage of the Providence schools for higher education. Daggett Park is the largest of the city's recreation grounds, and Collyer monument and the soldiers' memorial monument ornament the city. The old mill which witnessed the beginning of the cotton industry is still standing, and in it Pawtucket claims to have established the first Sunday school in the United States.

History. The place was settled in 1654. That part of the city which lies on the east bank of the river was originally a part of Seekonk, in Bristol County, Mass., and it became Rhode Island territory in 1862. The part on the west bank was the principal village of North Providence until 1874, when that town was divided; the two villages on the east and west banks were then incorporated as the town of Pawtucket, which in 1886 was chartered as a city.

PAYNE, *payn,* JOHN HOWARD (1792-1852), an American writer and actor, whose fame is secure as the author of *Home, Sweet Home,* one of the greatest songs in any language. He was born in New York, and studied there at Union College until he was sixteen, when he appeared for the first time on the stage. His youth and his undeniable genius won him immediate and great popularity. At a "benefit" performance for him the receipts were over $1,400, a sum considered in those days very large. He traveled over the United States, playing various parts, and was everywhere welcomed by crowded houses and greeted as a prodigy. In 1813 he went to London, and acted in England and in France for twenty years.

JOHN HOWARD PAYNE

He also wrote or adapted numerous plays, some of which have retained their popularity.

In *Clari, the Maid of Milan,* first written as a play, but turned by Payne into an opera, *Home, Sweet Home* was heard for the first time. Managers and actors were made rich by this opera, but Payne received very little of the proceeds. All his life, in fact, he was unfortunate; towards the end of his life he received an appointment as United States consul to Tunis, but it was a most uncongenial post. It was there that he died and was buried; but in 1883 his body was brought back to his native country and interred at Washington. During the interment, a thousand voices sang his immortal hymn. A portrait statue by Alexander Doyle stands at his grave.

Possibly there never was a better summary of Payne's life than that poetically expressed by Will Carleton, although he may have overemphasized somewhat the dreariness of the actor-author's existence. In the course of a poem relating to *Home,* Carleton says:

But he who in thy praises was sweetest and best—
Who wrote that great song full of soothing and rest—
"Through pleasures and palaces though we may roam,
Be it never so humble, there's no place like home"—
He who, in a moment unfettered by art,
Let that heavenly song fly from the nest of his heart,
He wandered the earth, all forgot and alone,
And ne'er till he died had a home of his own!
He wandered the earth at his own dreary will,
And carried his great heavy heart with him still;
He carried his great heavy heart o'er the road,
With no one to give him a lift with his load;
And wherever he went, with his lone, dreary tread,
He found that his sweet song had flown on ahead!
He heard its grand melodies' chimes o'er and o'er,
From great bands that played at the palace's door;
He heard its soft tones through the cottages creep,
From fond mothers singing their babies to sleep;
But he wandered the earth, all forgot and alone,
And ne'er till in Heaven had a home of his own!

Consult Hanson's *The Early Life of John Howard Payne;* Brainerd's *John Howard Payne: A Biographical Sketch.*

PEA, the common name of an important genus of plants belonging to the pulse family. Of the several species, the best known is the garden vegetable whose delicious unripe seeds are so generally liked and used as a table food. These are borne in oblong, green pods, which follow the delicate white blossoms. Field peas, which are grown in considerable quantities in

the Northern United States and in Canada, are used as food for stock. There are also several species that bear lovely fragrant flowers and are cultivated as ornamental garden plants. Among these are the sweet pea (which see), the chick pea and the everlasting pea. All species are supposed to be derived from wild plants native to Southern Europe and Southwestern Asia.

PEAS
Branch of a vine and green pods enclosing peas.

The Common Garden Pea. Under cultivation, many varieties of the garden pea have been developed. There are, however, two distinct types, those bearing seeds with smooth coats, and those whose seeds have wrinkled coats. The smooth-seeded, which are the hardier and so are planted the earlier, are usually low-growing plants; the wrinkled-seeded produce a tall twining stem that requires some sort of a support. The seeds of both kinds are planted about three inches deep and about two inches apart in the row, but the seeds of the taller varieties are planted in rows four feet apart, as compared with eighteen inches for the others. In the latitude of New York the planting season is from March to June, and early varieties are harvested from June on. A variety known as *sugar pea,* which is sown in April, bears edible pods that are picked when small and tender (in July) and are cooked like string beans.

Food Value. Green peas, fresh from the pods, constitute one of the most appetizing of the summer vegetables; as their delightful flavor is not lost when they are properly canned, they can be enjoyed the year round. That they are nutritious is shown by the following figures (an average analysis): water, 74.6 per cent; protein, 7; fat, 0.5; carbohydrates (starch and sugar), 16.9; ash, 1.0. The fuel value (see CALORIE) for green peas is 465 calories per pound. Dried peas, which are baked, used for soups and cooked in various other ways, are even more nutritious, as their percentage of protein is 24.6, and of carbohydrates, 62. Their fuel value, too, is high, being 1,655 calories per pound.

PEABODY, *pe'bodi,* MASS., a town in Essex County in the northeastern part of the state, prominent in the manufacture of leather, leather goods, boots and shoes. It is two miles west of Salem, and is on the Boston & Maine Railroad; electric lines connect with cities and towns northwest and southeast. Peabody has a convent, the Peabody Historical Society, Eben Dale Sutton Reference Library and Peabody Institute, the last having a fine collection of paintings and a library of more than 38,000 volumes. Thomas Hospital and Emerson Park are worthy of mention. Besides the leather manufactories, the town has plants for making leather-working machinery, electrical supplies, soap and glue. Peabody was first a part of Salem and then of Danvers; it was incorporated as South Danvers in 1855, the name being changed to its present one in 1868, in honor of George Peabody, an American philanthropist who was born there and who founded the Peabody Educational Fund (see below). Several villages unite to form the town of Peabody, which in 1920 had a population of 19,552, an increase of 24 per cent since 1910. The area exceeds sixteen square miles.

PEABODY EDUCATION FUND, an endowment made in 1867 by George Peabody, an American merchant and philanthropist, for the advancement of education in the South. The original fund, including a second donation made in 1869, amounted to about $2,000,000. At the end of the first thirty years the trustees of the fund had distributed more than $2,500,000, having given aid to numerous elementary and normal schools, besides awarding a number of scholarships. In 1875 the trustees founded, at Nashville, Tenn., a school for the higher training of teachers, known as the State Normal School. In 1887 the name of this institution was changed to *Peabody Normal College.* As the school grew in influence and the scope of its activities increased, a movement was started to make it a central teachers' college for the entire South. As a result of this idea, the George Peabody College for Teachers was incorporated in 1909, and the money and property under the control of the trustees of the Peabody Fund were transferred to the trustees of the new institution, thus terminating the trusteeship of the original fund.

The *George Peabody College for Teachers* occupies a campus of about fifty acres on the east side of the Hillsboro Pike. By 1916 four

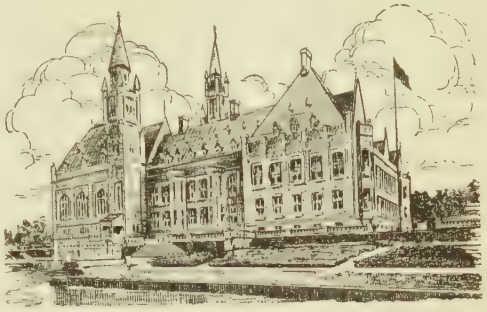
new buildings had been completed, at a cost of about $750,000. The institution has received donations from the state of Tennessee, the city of Nashville, Davidson County, the University of Nashville and the alumni association, and it is planned ultimately to have on the campus a group including eighteen recitation and laboratory buildings, fifteen dormitories and several practice and demonstration schools. College sessions were begun in June, 1914, and during the first summer session there were over a thousand students in attendance. The regular enrolment is about 300, and the faculty numbers over thirty. There is a college library of 40,000 volumes.

George Peabody (1795-1869) was born in Massachusetts. At the age of eighteen he began to work for a wholesale dry goods merchant of Georgetown, D. C. Later, when the firm had become established in Baltimore, he rose to be head of the company. Having built up a great fortune, he founded in London the firm of George Peabody & Co., and in that city he spent the last years of his life. His endowment for education in the South is but one of many notable contributions for the advancement of education, art and music.

PEACE, Breach of the. In the days when the king was supreme in England, it was held that he had a right to peace within his realm. Whenever a crime was committed against the royal laws the offender was arrested for disturbing "the king's peace," and was tried before a *justice of the peace.* In modern times a serious crime is not considered a breach of the peace; the latter includes only those offenses which invade the right of the people to live in orderly quiet. Thus, one who indulges in violent language to lawful visitors on his premises, or one who interferes with lawful meetings of others or prevents others from doing lawful tasks, or one who riots, may be arrested, without a warrant, for breach of the peace. A person who persistently annoys others may be required to deposit money or furnish a bond to be forfeited if he lapses from good conduct, or, as it is commonly expressed, be "put under bonds" to keep the peace.

PEACE CONFERENCE, 1918. See Versailles, Treaty of.

PEACE CONFERENCE, International, a congress of the chief powers assembled at intervals at The Hague, the ultimate object of which is the establishment of permanent peace, the more immediate aim being the settling of international controversies by arbitration and the lessening of wanton barbarities in war. The conferences at The Hague may be regarded as a definite expression of that growing abhorrence of war that began to manifest itself towards the close of the last century. This humane feeling



PEACE PALACE AT THE HAGUE
The gift of Andrew Carnegie to the world. The building and grounds cost $1,750,000.

seemed to be growing steadily in force until the outburst of the War of the Nations in 1914. So violent an upheaval appeared to indicate that existing proposals could hardly be thought of as a sufficient basis for a lasting peace.

The conferences were initiated by the czar of Russia, and the first congress met at The Hague on May 18, 1899. One hundred delegates, representing the United States, Mexico, China, Japan, Persia and Siam, and twenty-one European powers, were present. Three chief questions occupied the attention of the delegates: armaments and weapons, humane regulations in warfare, and mediation and arbitration. Each nation was represented on every committee appointed and had one vote. A final act, signed by all the powers on July 29, embodied the conclusions reached. This act consisted of three conventions or treaties, three formal declarations and six resolutions. The declarations prohibited (1) the dropping of explosives from balloons; (2) the use of shells diffusing poisonous gases; (3) the use of so-called "dumdum" bullets, soft projectiles which spread in the body. Great Britain and the United States declined to approve of the second and third prohibitions. The resolutions set forth the conviction of the conference that the burden of armaments should be lessened and that the size of military and naval budgets should be studied by the signatory powers with a view to reductions. Of the three conventions agreed to, one applied the humane provisions of the Geneva Convention to naval warfare. Another comprised a perfected code of the

rules of war on land. The third dealt with arbitration.

The convention relating to mediation and arbitration was generally regarded as the most encouraging work of the conference. The powers agreed to submit serious disputes to arbitration, questions involving "national honor" and "essential interests" being excepted. The machinery for adjusting grievances is provided for in a Permanent Court of Arbitration, with a bureau at The Hague. The court consists of four representatives of each power, chosen for six years. The trial court consists, unless otherwise arranged, of two members chosen by each nation involved in the dispute and a fifth chosen by the four previously named. Mediation might be requested by the nations involved or tendered by a neutral power.

A second conference held in 1907 adopted thirteen conventions intended to strengthen the cause of arbitration and prevent needless cruelty in war. It established an international prize court and insisted on the inviolability of the postal service.

The peace movement suffered greatly in all belligerent countries during the War of the Nations; but since the majority of the pacifists, while believing that war is always an evil, believe also that it is not the greatest possible evil, the great war was not looked upon as a complete relinquishment of the peace principles. The War of the Nations, they felt, might make future wars impossible. G.B.D.

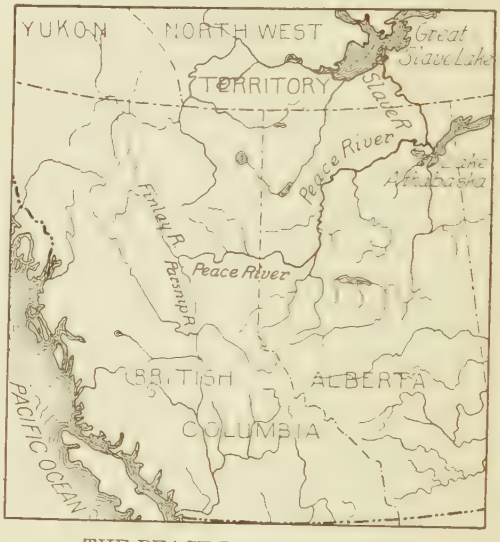
Consult Andrew's *The Promotion of Peace;* Butler's *The International Mind;* Eliot's *The Road Toward Peace.*

Related Subjects. The reader is referred in this connection to the following articles in these volumes:

Arbitration, subhead *International Arbitration*
Carnegie, Andrew
Geneva Convention
Hague, The
International Law
International Relations
Versailles, Treaty of

PEACE RIVER AND PEACE RIVER COUNTRY. The Peace River, in Western Canada, is the greatest of the tributaries of the Mackenzie River. It rises in British Columbia, cuts its way through the Rocky Mountains, then flows northeast across Alberta into the Great Slave River just below the point at which the latter issues from Lake Athabaska. Its course to the headwaters of the Finlay, its principal tributary, is 1,065 miles long, and its drainage basin includes 117,000 square miles, an area equal to nearly one-half that of Alberta.

Details of Its Course. The Peace River is formed by the junction of two streams, the Finlay and the Parsnip, both of which rise in British Columbia. The Finlay, the larger of the two, rises in the north-central part, and flows southward; its source is less than twenty miles east of the Skeena River, which flows southwestward into the Pacific Ocean. The Parsnip rises in the central part of the province, at a point about fifteen miles from another large southward-flowing stream, the Fraser, whose great bend is caused by the same mountains on which the Parsnip rises. The Finlay



THE PEACE RIVER COUNTRY

River is 250 miles long, and the Parsnip, 145 miles.

From the confluence of these streams to the junction with the Slave River is a distance of about 815 miles. For 300 miles it follows a general easterly direction, with an average fall of two and one-half feet per mile, to the mouth of the Smoky River, which is its principal tributary. Up to this point the river valley is really a channel cut through a plateau. Back from the river the land is level or rolling, and is thinly wooded. Below the mouth of the Smoky River, the Peace turns, and pursues an irregular but generally northward direction almost to Fort Vermilion. The lower part of its course, to its mouth, is again eastward. Below the Smoky, steep sandstone cliffs at first border the bed of the Peace River, but farther down the valley becomes wider and shallower. Plains, covered with grass or a sparse growth of trees, border it on both sides.

The Peace River Country

Agricultural Conditions. A few years ago all works of reference dismissed the Peace River with a brief article, usually ending with the words: "Its valley is fertile." To-day it is known that the Peace River Country is one of the few remaining large tracts of unsettled arable land, a section which will support thousands of people and provide for them a pleasant, healthful home. In the neighborhood of town of Peace River the farms which are already under cultivation prove that the land is suitable for the production of all kinds of cereal and root crops. In the vicinity of the "Waterhole," thirty miles from the Landing, are many farms of 500 acres or more. The production of wheat ranges from forty to fifty-five bushels to the acre; oats, about sixty bushels; and barley, seventy bushels. Corn, tomatoes and other garden vegetables ripen satisfactorily in that section. At Fort Vermilion, nearly 300 miles from Peace River town, wheat, planted on April 15 and harvested on August 17 has yielded forty-two bushels to the acre. The finest agricultural section is the district in Alberta south of Peace River near the boundary of British Columbia with the town of Grande Prairie as centre. Large tracts at various points are suitable for stockraising.

Transportation. Until the beginning of the twentieth century easy means of communication were lacking, travel was difficult, and settlers were advised to keep out of a section which was far from markets. These conditions are rapidly changing. The Edmonton, Dunvegan & British Columbia Railway has been completed to Peace River and also to Grande Prairie. The Pacific Great Eastern Railway when completed will provide easy access to the Peace River Country.

Until the Peace River emerges from the Rocky Mountains it is not navigable, but below Hudson Hope, at the lower end of Rocky Mountains' Canyon, there is no obstruction to steam navigation until the Vermilion Chutes are reached, about 500 miles farther down. At the Chutes the river plunges over a limestone ledge ten feet high, but the completion of tramways here will greatly facilitate the transshipment of goods. On Great Slave River there is a similar obstruction at the Slave Rapids, tractors being now employed to draw freight from Fitzgerald to Fort Smith. With these two exceptions there is a total distance of 2,200 miles of river, navigable for steamers drawing four feet of water, from the Rocky Mountains to the mouth of the Mackenzie River. The Peace River has an average depth of twenty to thirty feet, and an average width of one-half to three-fourths of a mile. The current is always fairly rapid, seldom falling below two and one-half miles an hour.

Timber and Mineral Resources. In its primitive state, the Peace River Country was probably covered with dense growths of spruce and other coniferous trees. These forests have been destroyed to a large extent by fire. Here and there are patches of this first growth, and in some of the river bottoms are groves of old cottonwoods, but for the most part the forest area is covered with a second growth of aspen and birch, always with some spruce intermingled. On higher ridges there is often a thick growth of scrub pine and spruce, and in swampy soil tamarack is found. The timber is one of the most valuable resources of the Peace River Country.

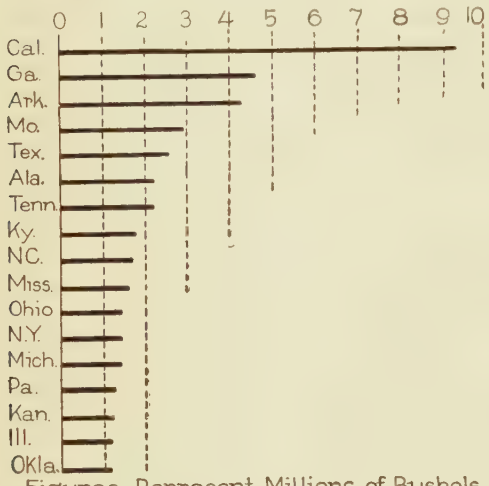
Of minerals, too, there seems to be a considerable variety, although the search for minerals has far from disclosed the wealth of the region. Gold, iron, lignite, anthracite, gypsum, natural gas and oil are those which seem to promise successful commercial development. Considerable attention is now being devoted to the oil and natural gas resources of the district.

Fish, Game and Fur-Bearing Animals. The Peace River district, taken as a whole, has an abundant stock of fish, including whitefish, lake trout, pickerel, pike, bluefish, sucker and Back's grayling. The Peace River itself is not so plentifully stocked as the smaller rivers and the lakes. On the west side of Slave River between Peace and Mackenzie rivers is the ranging ground of the only herd of wood buffalo now known to exist, but moose are plentiful, and red deer, blacktail deer, black and brown bear exist in large numbers. Caribou are found in the northern part. Game birds, including prairie chicken, ruffed grouse and partridges are found everywhere. The fur-bearing animals are still plentiful; these are the mink, otter, beaver, black and red fox, wolf, lynx, skunk, marten and weasel, among the most important. The fur catch is increasing steadily. J.M.S.

PEACH, *peech,* a fruit of temperate climates, surpassed by none in beauty, fragrance or flavor. It is essentially a product of the United States, for that country raises more and better peaches than any other section of

the world; there the peach is second in importance, among orchard fruits, only to the apple. The peach tree, however, is not native to North America, but to Asia; its supremacy as a Western world plant is due both to improved methods of culture and to adaptability of soil and climate. The tree belongs to the rose family.

Distribution and Production. Though not so hardy a fruit as the apple, the peach is grown successfully in certain sections of Canada,



THE CROP

The production indicated above represents the average yearly yield for a period of five years.

notably in Ontario. In the United States its distribution is wide, but somewhat irregular, as it is very sensitive to frosts. It flourishes along the eastern and southern shores of the Great Lakes, where the climate is tempered by nearness to those large bodies of water; orchards are found in the eastern tier of states from Connecticut to Georgia; in the northern part of Florida there are several peach-growing areas; and the fruit is cultivated extensively in various sections of the Mississippi Valley and in California. Such a summary is, of course, very general, and does not indicate that the fruit is grown to a greater or less extent in at least forty of the states. Probably the peaches of Maryland, Delaware, Georgia and Michigan are the most widely known.

The accompanying charts show the average annual yield of the leading peach states. Though Maryland and Delaware (which do not appear on the chart) are famous for their peaches, their output is comparatively limited because of the size of the states. Delaware raised 842,000 bushels in 1915, and Maryland 1,248,000, both figures showing a marked increase over previous years. The average annual yield for the entire United States is about 45,500,000 bushels. In the period from 1910 to 1915, the farm price per bushel varied between $1.36 and 81 cents.

Classes and Varieties. The familiar division of peaches into *clingstone* and *freestone* groups is not wholly satisfactory, as there is no hard and fast distinction between these two classes. About 300 varieties have been developed by American horticulturists, which may be grouped as follows:

(This classification, compiled by Professor R. H. Price, of the Texas Experiment Station, is accepted as standard in its essential features, and all later classifications are based upon it.)

(1) *Peen-to,* a medium-sized fruit flattened endwise, having a sweet but peculiar flavor; color of skin, white mottled with red; grown usually in the southern range of the peach area.

(2) *South China,* a small oval fruit, somewhat flattened.

(3) *Spanish,* or *Indian,* a late fruit, generally yellow, with a hairy skin.

(4) *North China,* a large, oval fruit.

(5) *Persian,* including most of the large yellow or white-fleshed varieties cultivated in the northern part of the United States.

Among the best-known commercial varieties of the fruit are the Elberta, the most popular peach in America; the Belle of Georgia and the Crawford. The nectarine (which see) is really a variety of peach, but is sometimes considered a separate species because its smooth skin lacks the downy fuzz characteristic of a true peach.

Culture. Fruit growers obtain trees for the orchard from nurserymen, who propagate the plant from seeds. As the seeds do not, as a rule, produce plants of their own type, desired varieties are obtained by budding the seedlings, a process explained in these volumes in the article GRAFTING, subhead *Bud Grafting.* In the South, trees budded in June are sometimes transplanted to the orchard the following fall, but in the North it is customary to permit the young tree to grow a season before taking it up; that is, to transplant it when it is one year old. The trees are set from eighteen to twenty feet apart each way, as compared with thirty to thirty-five for apple trees, which are somewhat larger.

Peach trees grow to a height of from fifteen to twenty feet, and bear long, slender leaves and lovely, delicate pink blossoms. They begin to bear fruit about the third year after trans-

planting, but are short-lived, and an orchard, to be continuously profitable, must be frequently replenished. A light, sandy, gravelly soil, with good drainage, is considered to bring the best results. Peach trees tend to blossom early, and in localities where late frosts are prevalent it is often necessary to retard budding. This is sometimes accomplished by whitewashing the trees in the fall or winter. Another protective measure consists in planting the orchard on hillsides with a northern exposure.

Of the diseases to which the peach is subject the *brown rot* is one of the most troublesome. It especially attacks the ripening fruits, giving them a covering of ash-colored spores. A reliable remedy for this disease is Bordeaux mixture, described in these volumes in a subhead

EFFECT OF BROWN ROT

under Insecticides and Fungicides. Another serious disease is *leaf curl,* which if unchecked strips the tree of foliage. This also is prevented by applications of Bordeaux mixture. The *yellows,* a disease prevalent among peach orchards in the United States, spreads rapidly through bud inoculation, and is very difficult to eradicate. The fruit, red-spotted, ripens prematurely; the winter buds develop in the summer or autumn; the foliage gradually yellows; the branches become stunted and put forth sterile shoots, and, finally, the tree decays and dies. Extermination of the affected trees seems to be the only effective means of checking the disease. Among insect enemies of the fruit are the San José scale, the peach borer, the plum curculio and the fruit bark beetle.

Food Value. Because of their tempting appearance and delicious flavor—qualities which are a direct aid to digestion—peaches are a more important food than their composition would indicate. They contain, on an average, 89.4 per cent of water, .7 per cent of protein, .1 per cent of fat, 9.4 per cent of carbohydrates (chiefly sugar) and .4 per cent of ash. The fuel value is 190 calories (see Calorie) per pound. Their high proportion of water makes them especially valuable as a laxative food. As is true of most other fruits, their actual nutritive value is increased by canning, preserving and drying processes. B.M.W.

Consult "Growing Peaches," in United States Department of Agriculture *Farmers' Bulletin 633.*

PEACOCK, *pe'kok,* the male peafowl, the handsomest of the pheasants, having an iridescent, greenish-blue neck and breast, and very long tail coverts, in which the feathers are brilliantly marked with bold, eyelike spots. This train it is able to raise and spread into a gorgeous fan, of which the bird itself is apparently the chief admirer. The hen is smaller than the cock, which is about as large as the domestic male turkey; also it is less exquisitely colored than the cock, and is without the train.

Occasionally peacocks with almost pure white plumage are seen. The male has the great, fanlike tail, but it, too, is white, with faint shadings to indicate the "eyes," or disks.

Unfortunately, the voice of this gorgeous bird does not match its plumage. It is a harsh, strident note, and helps to prevent the bird from becoming popular as a domestic fowl, a position to which its ornamental appearance might recommend it. The birds thrive in captivity, but multiply slowly.

The best-known species of peafowl is found in a wild state in India and Ceylon, where, in the midst of varicolored tropical foliage, the vivid coloration is protective. These birds eat snails, frogs and insects, as well as grain, juicy grasses and bulbs, and are often destructive to growing crops. Another species, resembling the former in plumage, is native to Burma, Malaysia and Java. Domesticated peacocks are found in all parts of the world. The young do not bear well the changeable weather of temperate climates and are difficult to rear. The hen makes her nest in some secluded spot on the ground, laying ten or more brownish eggs.

In ancient times, the peacock was carried to all parts of the known world as a great treasure. During the reign of Solomon "once every three years came the navy of Tharshish, bringing gold and silver, ivory, and apes, and peacocks" (*I King* X, 22). The peacock is mentioned in the *Bird Play* of Aristophanes, written in Greece

"THAT ROYAL BIRD, WHOSE TAIL'S A DIADEM"

in the fifth century B. C., and Pliny speaks of it as common in his day in Rome, where it was considered a great delicacy as a roast served in its own feathers. See PHEASANT.

PEALE, *peel,* the family name of two painters,. father and son, who achieved distinction.

Charles Wilson Peale (1741-1827), an American painter, famed for his series of portraits of Revolutionary soldiers and statesmen. Of his fourteen portraits of Washington, the best-known was painted by order of Lafayette for the king of France. During the French Revolution it was presented to the National Gallery at Washington, D. C., where it may now be seen. Another is on exhibition in the New York Metropolitan Museum. Many of Peale's portraits also adorn Independence Hall, Philadelphia. Among other noteworthy paintings are the portraits of Nathanael Greene, Count de Rochambeau, Horatio Gates and Baron de Kalb; *Christ Healing the Sick,* completed just before his death, is one of his few works upon subjects other than portraits.

Rembrandt Peale (1778-1860), a son of Charles Wilson Peale, was an American artist who gained renown as a portrait and historical painter. At the age of seventeen he began a portrait of Washington, from life, and one of the copies of this, executed in 1823, was purchased by the United States government for the National Capitol. Peale excelled as a draughtsman, but was less successful as a colorist, in this respect being inferior to his father. He was one of the original members of the Academy of Design, New York City, and for a number of years was president of the American Academy of Fine Arts. His fame rests chiefly on his portraits of noted men of his day. In addition to these, other well-known paintings are *The Roman Daughter, The Court of Death* and *The Ascent of Elijah.*

PEANUT, *pe'nut,* an annual plant of the pea family, which grows like a potato vine, and produces, underground, a nutlike pod, the familiar peanut of our markets. This plant, which is probably native to Brazil, is cultivated in warm regions the world over; in the southern part of the United States its culture is an industry of rapidly increasing importance. Three main varieties are cultivated in America—the *white,* the *red* and the *Spanish.* The white, which is the most important, bears a pod containing two kernels with pink skins; the pod of the red holds three and sometimes four kernels, the skins of which are deep red; Spanish peanuts are smaller than these, and their kernels have a milder flavor and a lighter skin than those of the other varieties.

Peanut Culture. Peanuts are planted in the spring, as soon as all danger from frost is past. They require a limy soil, and thrive best when the summer is hot and there is plenty of

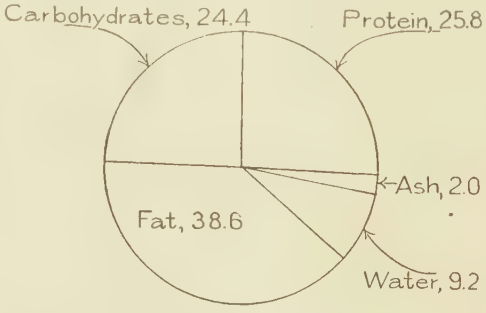
rainfall. Two or three of the kernels, with unbroken skins, are planted together one or two inches deep, in hills from sixteen to twenty inches apart and in rows about three feet apart. The earth is finely pulverized for a depth of four or five inches. Above ground the plant puts forth a thick, hairy stem with many branches. The flowers, which are small and yellow and in shape resemble those of the garden pea, grow singly on the vine. After they wither their stems grow longer and turn downward, forcing their way into the soil. There the familiar pale-yellow pods are developed.

The nuts ripen in October and are harvested before the first frosts appear. First the earth around the plants is loosened, and the vines are pulled up and turned over to dry in the sun for a day. They are then put in the shocks and

HOW PEANUTS GROW

so kept from three to six weeks, after which the pods are picked and made ready for shipment. About two bushels of unshelled nuts will plant an acre, and under good conditions the yield is over forty bushels to the acre. The vines bear, on an average, about 100 pods each. Before the nuts are marketed they are scoured in large, metal cylinders, which free them from pieces of dirt and stems, and are then passed through blast fans, in which powerful air currents weed out the imperfect nuts from the sound ones. Candy manufacturers make use of dark and imperfect kernels, so these are not wasted.

Uses. Peanut kernels, roasted and salted, are everywhere popular, but are usually eaten as a confection rather than as a part of the regular



COMPOSITION OF PEANUTS

As a heat producer the peanut ranks very high; it has a fuel value of 2,560 calories per pound. The fuel value of peas is but 1,650 calories per pound; beans, equal to peas; and potatoes, 1,700 calories per pound.

diet. They are, however, extremely nutritious, having a high percentage of fat, of carbohydrates and of protein (see accompanying chart). The fuel value, too, is high—2,560 calories (see CALORIE) to the pound. There is some question concerning the digestibility of the peanut, but it is generally agreed that it is more readily assimilated if eaten with other foods. Large quantities of peanuts are used in making candy.

Important manufactured products are peanut oil and peanut butter. The oil is used as a salad dressing, for packing fish and in the manufacture of oleomargarine, and low grades (yielded by third and fourth pressings) are utilized as machinery oil and employed in soap manufacture. The French use peanut oil as a base for their famous Castile soap. The residue from the various pressings, when moistened and baked, forms a cake which is a valued fertilizer and cattle food. A fine meal ground from peanuts is said to be excellent for muffins when mixed half and half with corn meal. It is also a suitable stock food. Peanut hay is widely used as food for hogs.

Production in America. The accompanying chart shows the average annual yield of six leading states for five years previous to 1915. Since 1915 the acreage in all of the peanut-growing states, especially Texas and Oklahoma, has shown marked increase, and the country's

crop for 1916 was worth $56,000,000, as compared with $18,272,000 for 1909. This stimulation of the industry was partly the result of the great war in Europe, which cut off imports of both the nuts and the oil. Another factor was the scarcity and high price of cotton seed. Many

PEANUTS GROWN IN A YEAR

The chart represents average number of bushels for a period of five years prior to 1916. Texas will soon advance near to the head of the list, with Oklahoma closely following.

cottonseed-oil manufacturers in the South began using their equipment to make peanut oil, and thousands of acres, especially in the territory infested with the cotton-boll weevil, were given over to peanut culture. W.F.R.

Consult Roper's *The Peanut and Its Culture;* Beattie's "The Peanut," in United States Department of Agriculture *Farmers' Bulletin 431.*

PEAR, *pair,* a favorite orchard fruit belonging to the rose family, which includes also the apple, peach, plum and cherry. Of these it is most like the apple in structure, having a core and seeds in the center instead of a pit. Pears, however, are juicier than apples and, generally speaking, more mellow in taste. A typical pear is irregularly cone shaped, not round, but there are apples which look like pears and pears which look like apples. A real distinction is the presence, in the tissue of the pear, of cells containing a hard, woody substance. This is why the pulp of a pear does not feel so smooth, when eaten, as that of an apple.

Production. The pear tree grows quite generally throughout the temperate regions, but its cultivation has been attended with best results in France and the United States. In the latter country, the annual yield is between 8,000,000 and 9,000,000 bushels, valued at about $8,000,000, and the fruit ranks fourth in importance (among orchard fruits), following apples, peaches and plums. The most important areas of production are the Northeastern states, from New England to the Great Lakes; and the Pacific coast states. According to the Thirteenth Census, California, New York, Michigan and New Jersey lead in amount of crop, but the fruit is raised to a greater or less extent in every state in the Union. In Canada the chief pear centers are in Ontario and Quebec. In the Burlington district in Ontario, about 1,000,000 baskets are produced a year. Many Canadian pear growers are developing the fruit for export to Great Britain.

Culture. Favorites among the many commercial varieties developed by American horticulturists are the Bartlett, the Anjou, Le Conte and the Kieffer. The last two are the result of crossing two species of the eastern hemisphere, the native European pear and the Chinese pear, a small, gritty fruit that is not good to eat unless cooked. Two varieties of trees are cultivated in orchards—the standard and the dwarf. Both are propagated by budding on stock grown from seeds (see *Bud Grafting* in the article GRAFTING), but dwarf varieties are obtained by using the quince as stock. These latter grow from twelve to fifteen feet in height and bear earlier than standard varieties, often producing a fruit superior in size and flavor. Trees of standard varieties should be planted in well-drained, clayey loam, but the dwarfs will thrive in a lighter soil. The former are set from eighteen to twenty-five feet apart each way, and the latter, from ten to sixteen. Pear trees,

THE PEAR

in general appearance, resemble apple trees, though they are not so rugged; they bear long, oval leaves and creamy-white blossoms. The fruits are picked before they are fully ripe and stored in cool rooms to mature, or packed in barrels or boxes for shipment. They develop a better flavor and are less likely to decay than if allowed to ripen on the trees.

Two diseases are especially dreaded by pear growers—*leaf spot,* a fungous growth that attacks leaves, fruit and young twigs; and *pear* or *fire blight,* a bacterial disease that works within the plant. Bordeaux mixture (see subhead under INSECTICIDES AND FUNGICIDES) is an

PEARL DIVERS. Women divers are employed almost exclusively in Japan, where these pictures were taken. About six times each hour they rest for five minutes.

effective remedy for leaf spot. Fire blight, the most serious menace of the prosperity of the pear industry, turns the leaves and blossoms black, and if allowed to go unchecked will attack even the wood and bark. In such cases a sticky substance oozes out from the bark, that may be carried by insects to other trees and so spread the disease. The most satisfactory method of combating fire blight consists in pruning suspected twigs and branches during the winter. Wounds must be sterilized with corrosive sublimate, and pruning tools, which may be a source of contagion, should also be thoroughly sterilized after each operation. A "clean up" at the right time may save an entire orchard.

Food Value. Fresh pears have a high percentage of water—84.4 per cent—and contain 14.1 per cent of carbohydrates and small amounts of protein and fat (see articles APPLE, PEACH, PLUM, for comparison of values). They are not only wholesome and laxative, but their juiciness and delightful flavor make them an aid to digestion. Dried pears have a carbohydrate content of 72.9 per cent, and the canned fruit, of eighteen per cent. Whether eaten fresh, or canned, preserved, baked or otherwise cooked, pears are perennially a favorite food. M.W.

Consult Brackett's "The Pear, and How to Grow It," in United States Department of Agriculture *Farmers' Bulletin 482;* Bartrum's *Book of Pears and Plums.*

PEARL, *purl,* a small, lustrous drop of shelly substance, produced by oysters, clams and other mollusks. Pearls are of many hues, from silvery-white to black, and all have a satiny sheen. The explanation of their formation is one of the most interesting facts in nature. The smooth, iridescent lining seen on the inside of a mollusk shell is the secretion of the animal within. It sometimes happens that a grain of sand, the egg of some minute sea animal or other substance becomes lodged inside the shell, irritating the soft body of the occupant. In order to avoid this irritation of its delicate body, the animal proceeds to cover the object with layers of mother-of-pearl, and in so doing it may produce a gem of great value. Round or pear-shaped pearls entirely detached from the shell are the most highly prized. The largest known pearl is in the Victoria and Albert Museum, in London. It is four and one-half inches in circumference and weighs three ounces. The pearl is the birthstone for June.

From the earliest times pearls have been worn in jewelry, and many romantic stories have been told of individual pearls of great rarity. Perhaps the most familiar is the account of Cleopatra's having swallowed a gem that would now be valued at $300,000 or $400,000 (see, also, subhead *Some Famous Gems,* in the article GEMS). Romance, too, has been woven about the business of diving for pearls, largely, no doubt, because of the peril involved. The pearl oyster lives at a depth of from eight to twenty fathoms, and is found in the greatest numbers in the channels dividing groups of islands, where there is a strong, dredging current. The diver goes to the bottom armed with a net of rope for scooping up the shells. In shallower water, where the pressure is not so great, a diver may remain at the bottom for as long as two hours. The shells so collected are unloaded from boats on the sand and allowed to lie until the mollusks have decomposed. They are then washed in sea water, and the hunt for gems begins.

Fisheries. The chief fisheries are to be found in the Persian Gulf, among the Polynesian Islands, in the Sulu Archipelago, along the northern and western coasts of Australia and off the coast of Lower California. The Persian Gulf is particularly famous for its fine pearls, but Australia has become no mean rival in recent years. The Mississippi River and its tributaries furnish fresh-water pearls of considerable value, and the mussel shells are much in demand for the making of buttons, knife handles and other articles of commerce. Muscatine, Iowa, is the center of this industry. Imitation pearls are cleverly executed in many parts of the world. G.B.D.

Consult Kunz and Stevenson's *Book of the Pearl;* Kunz's *Pearls and Pearl Fisheries of the United States.*

Related Subjects. The reader is referred to the following articles in these volumes:

Birthstones	Mother-of-Pearl
Gems	Muscatine, Iowa
Mollusks	Oyster

PEARY, ROBERT EDWIN (1856-1920), an American Arctic explorer, the undisputed discoverer of the North Pole. He was born at Cresson, Pa., educated at Bowdoin College, and became a civil engineer in the United States navy. From 1884 to 1888 he was employed in surveys of the projected Nicaragua Canal, at first as assistant engineer and later as chief. A voyage to Greenland, with a trip into the interior, interested him in Arctic research, and in 1891 he set out in charge of an expedition. The most important geographical knowledge gained from his explorations was the fact that

Greenland is an island. Other expeditions in 1893-1895, 1896 and 1897 resulted in important gains for science, and an account of all the journeys was published in 1898 in *Northward Over the Great Ice*. In the same year he set out on a voyage with the avowed intention of discovering the North Pole. He was absent for four years, and while not successful in his main quest, made important discoveries. The northern coast of Greenland was surveyed, and a latitude of 84° 17′ 27″ was reached, the highest till then ever attained in the western hemisphere.

REAR-ADMIRAL PEARY
On April 6, 1909, he reached the most northerly point in the world, from which, in whatever direction he looked, he faced south.

In 1905 Peary set out in the *Roosevelt*, a ship built for the purpose, which he left on the north coast of Grant Land while he pushed on northward with sledges. He reached latitude 87° 6′, thus establishing a new "farthest north" record, but was forced by privations to turn back. *Nearest the Pole*, published in 1907, tells of this journey. A second expedition in the *Roosevelt* was undertaken in 1908. Again the ship was left in Grant Land, while Peary and his companions went on over the ice. One after another of his companions turned back because of a shortage of supplies, and only four Eskimos and one negro servant were with Peary when, on April 6, 1909, he reached the Pole, the goal of many ambitions. From soundings taken he proved that the sea about the Pole is not a shallow body of water, as had always been held.

Peary's great news was not accorded the enthusiastic reception due it, because Dr. Frederick A. Cook, another American explorer, had announced one week in advance of Peary's return that he had reached the Pole in April, 1908. Careful scientific investigation, however, proved Dr. Cook's claims to be false and left the honor where it belongs—with Peary. Many honors were conferred upon the successful explorer, who was promoted to the rank of rear-admiral and given the thanks of Congress.

In May, 1917, after the declaration by the United States of a state of war with Germany, the rear-admiral was made chairman of the National Aerial Patrol Commission, organized under control of the Navy Department. See COOK, FREDERICK A.; POLAR EXPLORATION.

Consult Peary's *Nearest the Pole* and *The North Pole*.

PEASANT, *pez'ant,* **WAR,** a name given to the rising of the peasants in Central and Southern Germany in 1524-1525, sometimes called the GREAT PEASANT WAR, to distinguish it from other struggles of similar character which preceded it. The cause of these various risings was the desperate condition of the lower classes, who were oppressed in every possible way by their overlords and were allowed practically no rights; but the immediate occasion for the breaking out of the revolt was the Reformation, and the religious aspect was prominent throughout the struggle. The peasants felt certain that Luther would approve of their demands and that with his help they might easily win. But he was determined not to allow the religious movement to become involved with political struggles, and he saw, too, that though the demands of the peasants were for the most part reasonable, their methods of enforcing them were far from moderate. He used his influence, therefore, rather on the other side.

The peasant forces were without leaders or organization; irregular bands gathered and went about pillaging, burning castles and convents, murdering and committing many other excesses. As soon as they were set upon by a regular army they were reduced to submission and the revenge which was taken on them was as frightful as their own earlier cruelties had been. According to authentic accounts, about 100,000 persons were killed in this struggle, and the condition of the peasants afterward was worse than it had been before.

PEAT, *peet.* As stated in these volumes in the article COAL, peat is merely coal in the making. Both are valuable fuels produced by the decay of vegetable matter, and their formation illustrates one of the numerous ways in which Nature has made our planet a suitable habitation for mankind. The plants which formed the peat beds of the world grew in bogs where there was standing water, and their development began in ages long past. As these plants branched and intertwined they formed a thick mat on the surface of the marsh, causing the lower portions of the stems to die. The decaying vegetation sank lower and lower as the surface growth continued, forming a compact mass that would have turned into coal if there had been sufficient heat and pressure. Peat is thus the

first stage of coal. Deposits near the surface are usually brown; those farther down are black, as they are more nearly decomposed. The latter form of peat looks like wet, black clay. In the northern hemisphere the vegetation of the peat bogs consists chiefly of mosses, but rushes and similar aquatic plants formed the deposits of the southern hemisphere. It is supposed that peat forms at the rate of two to four inches a year.

Distribution. In Europe there are large peat areas in Russia, Norway, Sweden, France, Germany, Austria, Denmark, Holland and the British Isles, especially Ireland. In America the most important areas are in Alaska, Canada and the United States. Canada is estimated to have 37,000 square miles of workable bogs, the de-

A PEAT BOG

The illustration shows how peat is cut; the appearance of the field is the same, whether the cutting is by hand or by machinery. In the background is shown a pile of peat blocks, ready for drying.

posits of which are about five feet deep. Alaska peat is an exceptionally good fuel. A recent survey of the peat areas of the United States shows that the deposits represent an aggregate of nearly thirteen billion tons. Deposits are of frequent occurrence in the states of the Atlantic Coastal Plain from New Jersey to Florida, and in the northern tier as far west as North Dakota. The regions mentioned in this paragraph are the chief peat-forming areas of the world.

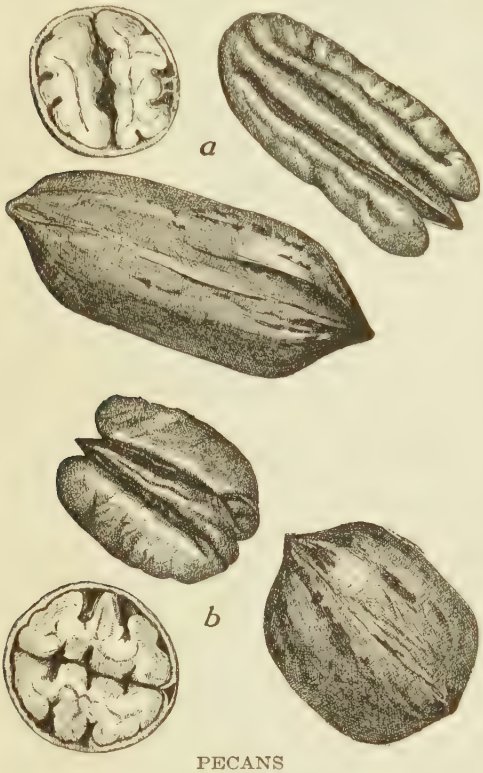
Uses. To make peat a suitable fuel it must be drained of its water content, which is sometimes nine-tenths of the weight. The expense and difficulty attending this process have tended to limit its production in America. In Europe, however, peat is burned in the homes of thousands of peasants, and there it has been a common domestic fuel for centuries. Various machines have been made for digging and grinding the raw material, molding it into blocks of desired size, and spreading these out to dry in the air. Tests are also being made to discover the practicability of using powdered peat as fuel. In the United States there were four peat-fuel plants in operation at the outbreak of the War of the Nations, and ten which were selling peat for fertilizing purposes. It is apparent that the American peat industry is as yet only in the experimental stage. In Canada the Dominion government maintains an experiment station where peat is prepared for fuel, and it is hoped that the deposits of the country will some day be utilized on a large commercial scale. Two Canadian peat-fuel factories closed in 1914 because of unfavorable conditions resulting from the great war.

There are various other ways in which this product is utilized. Brown peat, which is light and a good absorbent, is made into an excellent bedding for horses and cattle, and dried, powdered peat mixed with crude molasses is a stock food much used in Europe. Black peat, in which there is considerable nitrogen, is used as a fertilizer or as a filler for chemical fertilizers. This is the chief use to which peat is put in the United States. The fibers obtained from shredding peat prepared for stable litter are now being utilized in making paper, and as stuffing for upholstered furniture and mattresses. Charcoal obtained from compressed peat is highly valued as a fuel in iron smelting. Recently peat baths have been tried in a few sanitariums of the United States, with encouraging results. Such baths have long been in favor at German health resorts. E.C.

Consult Davis's "The Uses of Peat," in the United States Department of the Interior, Bureau of Mines, *Bulletin 16;* Gissing's *Commercial Peat.*

PECAN, *pe kan',* or *pe kahn',* a North American tree of the hickory family, which bears rounded, oblong nuts that find a ready market. Thin-shelled varieties are in greatest favor, as the shells can be conveniently crushed between the fingers; the sweet, nutritious meats, too, are easily taken out. The pecan tree is native to the states along the Mississippi, from Iowa southward, but it is now cultivated in all the Southern states and in California. In the South, especially, the raising of pecans is a thriving and rapidly growing industry, and in that section over 100,000 acres are planted to the tree. The owner of a pecan orchard, however, must be content to wait for returns. Though trees begin to bear when five or six years old, no profits can be expected before the end of ten years, and for

full returns on his investment the owner must wait another ten years. A good orchard of twenty acres will produce a crop of about 10,400 pounds of nuts at the end of ten years. The retail price varies all the way from fifteen cents to seventy-five cents a pound. Pecan trees have large, thick trunks, from four to six



PECANS

(*a*) Mobile pecan, showing shell, meat, and cross section. (*b*) Halbert pecan, with like illustrations.

feet in diameter at the base; they grow from 100 to 170 feet in height. The wood is hard but brittle, and so is not suitable for carpentry.

Consult Glen and Read's "The Pecan," in United States Department of Agriculture *Bulletin 251.*

PECCARY, *pek'a ri,* a group of animals similar to the smaller breeds of wild hogs. Two species are known—the common *collared peccary* of South America, Mexico and Southwestern United States, and the *white-lipped peccary* of Guiana, Brazil, Peru and Paraguay. The common peccary, which is about the size of a young hog, has a grayish, bristly coat and a narrow strip of white around its neck. The white-lipped, which is larger and of a darker gray color, is distinguished by its white mouth and nose. Both species are tailless, and each has a gland on the back which secretes an ill-smelling oil. Peccaries travel in herds and feed on both animal and vegetable matter. Sometimes they do considerable damage to grow-

THE COLLARED PECCARY

ing crops, but they usually offset such depredations by killing reptiles. They can be tamed, but are considered of little value as domestic animals, for their flesh is inferior to that of domestic swine.

PECK, Samuel Minturn (1854-), an American poet and a writer of fiction, whose verse often reflects the atmosphere of the South, his birthplace and home. He was born in Tuscaloosa, Ala., where he now resides, and was educated at the University of Alabama and at Columbia University, N. Y. His poems are published under the titles *Cap and Bells, Rings and Love-Knots, Rhymes and Roses, Fair Women of To-Day* and *The Golf Girl.* Among single pieces in verse a favorite and representative poem is his *Song for the South,* which begins:

O peerless land of tears and smiles,
Of fragrant glooms and golden hours,
Where Summer's hand with endless wiles
Entwines the feet of Time with flowers,
Howe'er the tide of fortune flow,
Thou hast my heart where'er I go!

His fiction, aside from short stories published in magazines, includes *Alabama Sketches* and *Maybloom and Myrtle.*

PECOS, *pa'kohs,* **RIVER,** the largest tributary of the Rio Grande, rising near Santa Fe, N. M., at the foot of Baldy Peak. Over the greater part of its course of 800 miles it flows southeast, running beside the palisade of Llano Estacado, a great, level plateau in New Mexico and Texas. It joins the Rio Grande in Texas, thirty-six miles north of Del Rio. Storage reservoirs have been built near Carlsbad, N. M., to utilize the waters of the Pecos for irrigation. See Irrigation.

PEDAGOGY, *ped'a go ji.* When the boys in ancient Greece and Rome went to school, they were accompanied by a slave who guided and protected them on the way. Sometimes this

slave, called a *pedagogue,* combined the duties of instructor with those of guardian, hence the name *pedagogue* was in olden times given the instructor of youth. From this word, which means *a leader of children,* the term *pedagogy* is derived. It originally meant the science of teaching, but its meaning has been gradually expanded until now the term is synonymous with *science of education.*

Relation to Other Sciences. Since the laws of psychology form the rules for teaching, pedagogy depends upon psychology for its foundation. It naturally follows, therefore, that the study of psychology should precede the study of pedagogy. Again, since the principles of teaching apply to all phases of instruction, pedagogy is related to all subjects found in the course of study. It relates to biology and physiology in physical education; to mathematics, logic and the sciences in intellectual education; to history, literature and ethics in moral education; so we speak of the pedagogy of arithmetic, the pedagogy of history, etc., meaning the application of the principles of pedagogy to the teaching of these subjects.

Pedagogy is not only related to the various branches in the course of study, but also to those movements which have for their purpose the betterment of society. It is related to and must secure the coöperation of the home, the Church, the vocations of the community and of the state in its numerous functions.

Underlying Principles. The science of pedagogy is built upon certain fundamental principles. The most important of these are:

1. **Relation of Mind and Body.** The brain and nervous system are the organism through which the mind acts, and this vital relation between mind and body is recognized by all educators. The mind works best when the body is in a state of health. Fatigue lessens activity (see FATIGUE). Defective sense organs are a hindrance to mental activity. Adolescence exerts a strong influence on mental activity (see ADOLESCENCE).

2. **Development of the Mental Activities.** The various forms of mental activity develop with the growth of the body, particularly the nervous system. The order of this development never varies. It is (1) the activities of perception or observation; (2) memory; (3) imagination; (4) thought, which includes conception, judgment and reason. The feelings and the will begin at birth.

The order given is that in which the activities through which the child acquires knowledge gain their ascendancy, and this principle should determine the method of presentation of subjects as well as the order in which they occur in courses of study. Children in the primary and intermediate grades, for example, memorize readily, but they have not reached that stage of mental development that enables them to solve problems requiring close reasoning.

3. **Attention.** Attention is an act of will and it lies at the foundation of all knowledge (see ATTENTION).

4. **Self-Activity.** All knowledge is gained by the self-activity of the learner. The child instructs himself. Those in charge of his education should point the way and remove the obstacles too difficult for him to surmount, increasing the difficulty of his tasks as his capacity increases.

5. **Order of Instruction.** The order of instruction should follow the order of mental development: (*a*) Observation before reason; (*b*) the concrete before the abstract; (*c*) the simple before the complex; (*d*) from the known to the unknown; (*e*) facts before definitions and principles; processes before rules.

Experimental Pedagogy. Since the beginning of the present century the experimental methods in psychology have led to the study of pedagogy along similar lines. The chief purposes of these experiments have been to make pedagogy more definite and practical in its applications and to determine standards of efficiency for children of various ages and in different subjects. The teacher is now able to study concrete results obtained by observations in different places and under different conditions. While further investigations will doubtless do much towards standardizing results already obtained, what has been already accomplished is exerting a strong influence upon methods of teaching and schoolroom administration.

Standards in writing, arithmetic, English, composition and other branches for children of different ages have been determined by long and careful studying of results obtained in different schools. A teacher by comparing the work of her pupils in the fifth grade with this standard in penmanship, for example, can tell how nearly they approach standard. The danger is that teachers may overlook the fact that these standards measure the minimum requirements for the grade. The influence of personal characteristics, aptitudes and fatigue upon the work of school children has been carefully noted, and one of the important results of these investigations is seen in the modification of courses of study in some school systems and of the daily program in others.

Present Tendencies. The study of education through the centuries has been progressive, and the movement has been from the theoretical and the abstract towards the practical and the concrete. The study of psychology has resulted in improvement in methods of teaching; scientific investigation and the application

of the principles of science to practical affairs have led to marked changes in the courses of study; modern facilities of communication, the rapid increase in periodical literature and the organization of all lines of industry along corporate lines have compelled educators to take cognizance of the increasing complexity of our social relations and to broaden the activities of the school to meet them.

Another strong tendency is away from the class toward the individual pupil. The worth of the individual is being more fully recognized as the years go by. The duty of the school to the state is being more fully recognized, and the school, the home and the community are being drawn closer together. All this means that the great aims of the public school to-day are to help the individual child to make the most of himself so that he may become a useful and worthy citizen, and to harmonize, through instruction and influence, the multiplicity of interest surrounding the pupil—in short, to lead the forces of society in establishing broader and more sympathetic human interests. W.F.R.

Consult Colvin's *The Learning Process;* De Garmo's *Interest and Education;* Bagley's *The Educative Process.*

Related Subjects. Methods of teaching the common branches are given in the respective articles on those branches. See ARITHMETIC; GRAMMAR, etc. Other subjects closely related to this are:

Attention	Nervous System
Education, page 1933	Psychology
Habit	Reason
Imagination	Thought
Interest	Will
Memory	

PED'IMENT, in architecture, the triangular space on the end of a building having a low, two-pitched roof. It is bounded by the rafters and a line joining their bases, or the cornices. In modern terms a pediment is a low gable. In stone buildings pediments are sometimes ornamented with sculpture. The finest examples of pediments in the world are those of the ancient Greek Parthenon (which see) at Athens. Probably the finest example in America is that of the Bank of Montreal, in that city. In the Middle Ages architects decorated doorways, windows and niches with forms which resemble and are called pediments.

PEDOMETER, *pe dom' e ter,* a small instrument resembling a watch, which measures the distance a person has walked. It is carried in the pocket, and at each step the motion of the body causes a small lever to move, and this records the number of steps taken. To get the distances one must find the average length of his step, and multiply. The name *pedometer* comes from the Latin word *pes,* meaning *foot,* and the Greek *metron,* meaning *measure.*

PE'DRO II (1825-1891), the last emperor of Brazil, known best as Dom Pedro, was born in Rio de Janeiro. When the boy was but six years old his father abdicated in his favor, but Pedro was not crowned until 1841; two years later he married the sister of Ferdinand II, king of the Two Sicilies. In spite of an enlightened reign, revolutionary disturbances were frequent and trouble threatened constantly with the neighboring states. Through his influence the Amazon River was thrown open in 1867 to the commerce of all nations; in 1871 a law to abolish slavery was passed, but did not take full effect until 1888. The following year a republic was proclaimed, and the emperor was forced to abdicate. He was granted a pension and sent away to Europe on a government vessel; he died in Paris two years later. As a careful student of government and education, he developed into a wise and discreet ruler, always avoiding violation of constitutional provisions.

THREE STYLES OF PEDIMENTS

On Carpenters' Hall, Philadelphia; on the Temple of Zeus, at Olympia; on the Temple at Assus, Egypt.

PEEKS'KILL, N. Y., a village in Westchester County, of much historical interest, located on the east bank of the Hudson River, just below the Highlands, forty-two miles north of New York City. It is served by the New York Central Railroad and by electric interurban lines. The village contains Depew Park, four military academies, Saint Mary's School (Protestant Episcopal), the Field Library, Helping Hand Hospital, Saint Joseph's Home and

a House of the Good Shepherd. Situated north of the town along the river is the state military camp. The chief industrial establishments are foundries and hat and underwear manufactories. In 1910 the population was 15,245; in 1920 it was 15,868, a 4 per cent gain. The area of the village is about four square miles.

Peekskill is the birthplace of Chauncey M. Depew; two miles east of the village was the summer home of Henry Ward Beecher. The old Robinson House, occupied in 1778-1779 by Generals Parsons and Putnam, and the following summer by Arnold, is still standing. It was here that Arnold first learned of the capture of André; and John Paulding, his captor, is buried in the old rural cemetery. The place was settled in 1764 by the Dutch, and named in honor of Jans Peek, a Dutch navigator. In 1816 it was incorporated as a village.

PEEL, Sir Robert (1788-1850), one of the foremost English statesmen of the first half of the nineteenth century. He was born near Bury, in Lancashire, educated at Harrow, where he became acquainted with Byron, and at Christ Church, Oxford.

The Youngest Chief Secretary. He entered Parliament as a Tory when but twenty-one years of age. In the next year he was made under-secretary for war and the colonies, and in 1812, at the unprecedentedly early age of twenty-four, became chief secretary for Ireland. In general, he pursued a moderate course in his six years' tenure of this office, but at one time he came into such open conflict with Daniel O'Connell over the Irish question that he sent him a challenge to a duel. Intervention of mutual friends prevented this, however. One great service he did for the distressed island, where conditions were so unsettled that neither life nor property was safe; he established the regular Irish constabulary, the members of which received the nickname of "Peelers."

Meanwhile, he had come to be regarded as an authority on financial affairs, and served in 1819 as chairman of a commission which brought about the resumption of specie payments. In 1822 he became home secretary in Lord Liverpool's government, and though he resigned in 1827 when Canning formed a Ministry, he resumed his former office in 1828 under the Duke of Wellington. Originally he had been much opposed to Roman Catholic emancipation, but he was always open to conviction and had by this time become so convinced that nothing else could bring peace to Ireland that he introduced a successful bill establishing it. In 1827 he organized the London police force, whose popular name of "bobbies" was derived from Peel's first name.

Period of Greatest Service. Peel retired from office in 1830, and was one of the chief opponents of the Reform Bill, which held public attention for the next few years. For a brief period in 1834-1835 he was Prime Minister, but remained chiefly in opposition until 1841, when as the leader of the Conservatives he was called upon to form a government. At the opening of the Ministry he was pledged not to bring about the repeal of the Corn Laws, yet that very measure was the central part of his administration. A famine in Ireland made conditions there desperate, and Cobden so pressed his Anti-Corn Law agitation that Peel at length exclaimed, "Let them answer him who can; I cannot;" and forthwith set himself to bring about the repeal of the obnoxious laws. In 1846 the repeal was carried, and in that same year Peel retired, having brought about a revision of the tariff and a revival of the income tax. During Lord Russell's Ministry Peel was a firm supporter of the free-trade principles which once he had decried, and lent his aid to an attempt to abolish the political disabilities of the Jews.

Changed with the Times. Peel had in the course of his official life changed his views on most of the great questions brought up for settlement, not because he was vacillating or inconsistent, but because he could not conscientiously refuse to take what he saw clearly were progressive steps. The nation has rarely had a minister whom it trusted more thoroughly, and the grief at his death was widespread. A. Mc C.

Consult Thurston's *Peel,* in Twelve English Statesmen Series.

PEER AND THE PEERAGE, *peer'ayj.* The word *peer* really means *equal,* but as used in England it refers to members of the *peerage,* or nobility, who are all equal in that each is entitled to a seat in the House of Lords, or Peers, and has a voice in all legislation there enacted. In England the peerage dates from the Norman conquest. Previous to that time the government was in the hands of a *witanagemot,* or parliament, composed of notable men without titles, who owed their positions entirely to ability and standing.

After the conquest in 1066 the country became practically the property of William I, the Conqueror, who proceeded to portion it out among his followers. The men to whom he

distributed land became barons, or direct tenants-in-chief of the king, to whom they were bound to render certain services in return for their lands. Such men were *king's men,* and could be summoned to the king's court to advise and take active part in the government of the country. Included among those who attended the king's court were bishops, abbots, priors and barons, who were gradually divided into greater and lesser barons, according to their holdings, but all equally barons in that they held their land direct from the king.

The hereditary peerage was of gradual growth, for the grants of land made by William I were not always intended to be passed on from father to son or next heir. However, it became customary, on the death of a baron, to install his son in his place and confirm his position by calling him to the king's court, the origin of the present Parliament. The king held his crown by hereditary right; the peerage assumed the same right and soon established the precedent.

The more powerful of the barons assumed the title of earl, a term which had implied high dignity under the Saxons, and until the reign of Edward III the peerage consisted only of earls, barons and ecclesiastics, the latter representing the interests of the Church. In 1337 the Black Prince was created Duke of Cornwall, thus bringing a new title, duke, into the peerage. In 1385 Richard II added the title of marquis, previously unknown. Still another addition was made by Henry VI, who created John Beaumont a peer with the title of viscount. Ecclesiastical peers were gradually eliminated, but at the present time bishops of the established Church of England take seats in the House of Lords as *Spiritual Peers,* their titles not being hereditary.

The peerage is now confined to dukes, marquises, earls, viscounts and barons, each title being hereditary and carrying with it certain honors, dignities and legislative privileges, which however can only be exercised in and directly connected with the House of Lords, the upper House of the Parliament. It is clearly laid down by English laws and customs that the children of peers, although receiving courtesy titles, such as *Lord, Viscount* or *The Honorable,* are yet commoners, and as such are entitled to no privileges not enjoyed by the humblest citizen.

Peer, in America. In the United States the word peer has no meaning except *equal.* When a man is placed on trial for an offense against the law he is guaranteed a hearing "before a jury of his peers." In this case "his peers" is taken to mean a representative jury composed of his fellow citizens. In the case of a peer of England the right of demanding trial by a body of peers is reserved, and a trial of a peer takes place before the assembled House of Lords. F.ST.A.

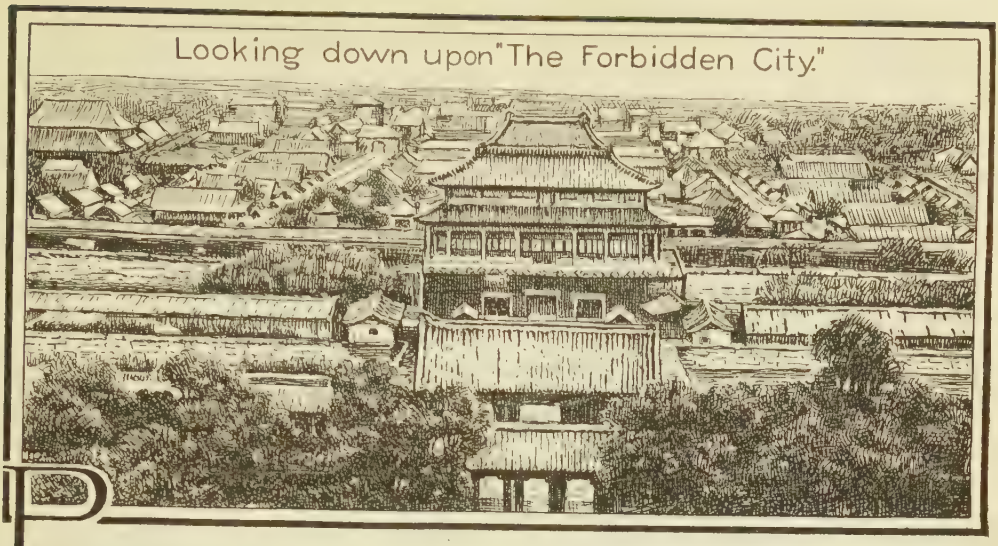
Related Subjects. A more detailed account of the rights and privileges of the various British peers will be found in the following articles:

Baron	Marquis
Duke	Parliament
Earl	Viscount

PEG'ASUS, the mythical winged steed which was fashioned by Neptune from the blood that trickled into the sea from the head of Medusa, as Perseus flew across bearing his hideous burden. At his birth, the horse flew to Mount Helicon, where he created the fountain Hippocrene with a blow of his hoof. Often he came to drink at the fountain of Pirene, and here Bellerophon, bearing the golden bridle given him by Minerva, found the animal grazing. At the sight of the bridle, Pegasus yielded himself captive and bore his master away to his successful battle with the Chimaera. After throwing the aged and conceited Bellerophon, Pegasus flew away to the skies and was made the constellation that bears his name.

PEKIN, Ill., the county seat of Tazewell County, located north and west of the center of the state, ten miles southwest of Peoria and 163 miles southwest of Chicago. It is on the Illinois River, which affords steamboat navigation, and on the Atchison, Topeka & Santa Fe; the Chicago & Alton; the Illinois Central; the Cleveland, Cincinnati, Chicago & Saint Louis; the Chicago, Peoria & Saint Louis, and the Peoria & Pekin Union railroads. In 1910 the population was 9,897; it was 12,086 in 1920, a gain of 22 per cent.

Pekin has a Federal building, a county courthouse, completed in 1916 at a cost of $250,000; a Carnegie Library and Pekin Mineral Park. The city is in a fertile agricultural country, and is an important grain market. It has manufactories of corn products, farm implements, wagons, stoves, box board and boilers. In the vicinity are deposits of coal. There is considerable water commerce in grain, lumber and coal. Pekin was settled in 1829 and was incorporated in 1850. In 1911 the commission form of government was adopted. The street railway is owned and operated by the municipality. P.H.S.



PEKING, *pe king'* (often pronounced *pa king'*), meaning *northern capital,* is the capital of China and one of the largest and most ancient cities of the world. It lies in a sandy plain, about twelve miles west of the Pei-ho, 100 miles from the Gulf of Pechili and seventy miles southeast of the Great Wall of China. Upon first approaching this curious city one sees nothing but a massive wall cut by sixteen gates and the outlying suburbs. This outer wall, surmounted by many lofty square towers, varies from thirty to fifty feet in height and is about twenty-five feet thick at its base. It encircles an area of about twenty-five square miles. The top is paved like a roadway, constituting one of the city's most pleasing promenades; from the summit the city seems to be a place of gardens.

Few congested districts are visible from this height, and the patterned roofs of the temples, palaces and mansions, with their blue, green and yellow tiles scattered among the groves of trees, afford a pleasing sight. However, the illusion is soon dispelled by the view of decay and dilapidation, poverty and filth, that is very apparent in over half of the great city, as the visitor comes into closer intimacy with the real Peking. Since 1910, however, modern improvements have greatly beautified the city, and in contrast with the Oriental atmosphere there is now seen the spirit of modern progress. Rail connection was established in 1897 between Peking and Tien-tsin, later with Mukden, and thence with Europe; telegraphic communication is maintained with the important centers of the world; and many other improvements have been inaugurated since foreign military powers set foot on Chinese soil.

Peking is divided into two parts, the Inner and the Outer City, which are in effect two separate cities. The former is known as the Manchu, or Tartar City, and occupies the northern site; the latter is the Chinese City. They are separated by a common wall extending east and west. The wall encircling the Tartar City averages fifty feet in height; that of the Chinese City, thirty feet. Each of the city's gates is imposing in appearance, with a watch tower about 100 feet high and many perforations for cannon.

The Tartar, or Inner, City. This former extremely important section is divided into three portions, one within the other. The outer enclosure is the largest, and constitutes what is known as the General City; the second section is the Imperial, or August City; and the innermost enclosure is known as the Purple, or Forbidden City, for prior to 1911 it was the residence of the emperor and his immediate family and of the highest officials in the realm.

The Forbidden City, surrounded by a deep, wide moat, and enclosed by a wall of bright yellow tiles, was guarded by many soldiers. Foreigners were forbidden entrance, and only Chinese who had official connection with the court might pass the gates. In these sacred precincts is the Hall of Highest Peace, where upon the throne in the spacious hall the emperor held his levees on New Year's Day, his birthday and on other state occasions. Just beyond is the Palace of Heavenly Purity, the emperor's former dwelling and the most mag-

nificent of all the palaces. The wife of the emperor, "Heaven's Consort," ruled her miniature court in the imperial harem in the Palace of Earth's Repose. Among other notable buildings in the Forbidden City are the Hall of

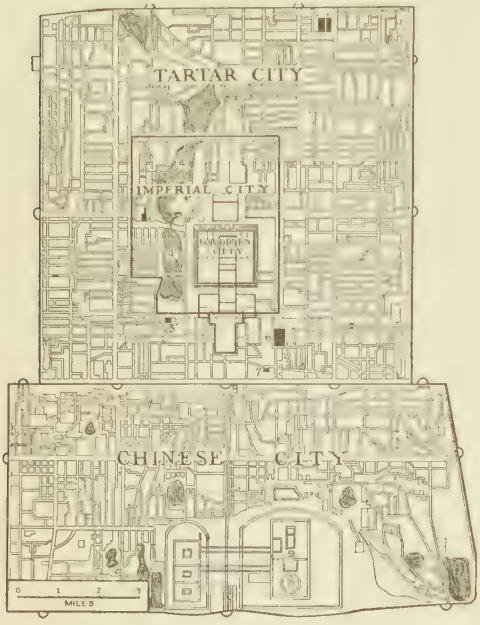


DIAGRAM OF PEKING

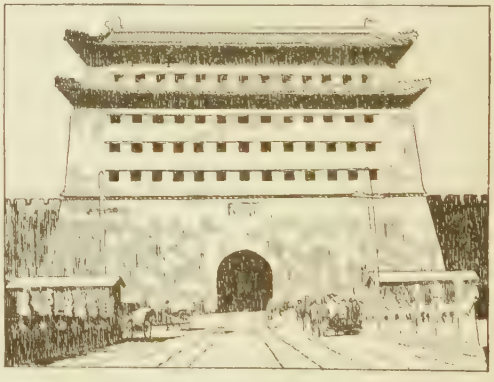
(1) Hall of the Classics
(2) Temple of Confucius
(3) Marble Bridge
(4) Lake of Lotus
(5) Mohammedan Mosque
(6) British Legation
(7) American Legation
(8) Chien-men
(9) Temple of Heaven

Intense Thought, where sacrifices were offered to Confucius and other sages; the Hall of Distinguished Sovereigns; and the Library, or Hall, of the Literary Abyss, the Guardian Temple of the City. All these former evidences of pomp and ceremony are now open to the public, to a limited degree.

Surrounding the Forbidden City is the Imperial City, oblong in shape, with a gate in each of its four walls. Here stands the Great Temple in which the emperor and the members of the imperial retinue worshiped their ancestors. Opposite is the altar to "the Spirits of the Land and Grain." Near by is Prospect Hill, 150 feet high, crowned with five Buddhist temples. It is separated from the Forbidden City by a moat crossed by marble bridges. The western portion of the Imperial City contains a beautiful park, whose chief attraction is an artificial lake where in season the beautiful lotus grows in abundance. The lake is spanned by a wonderful marble bridge. Among fine groves of trees are well-paved walks, leading to other parks adjoining. In this section is to be found the Temple of Great Happiness, the altar and temple dedicated to Yüan Fei, the discoverer of the uses of the silkworm.

Outside the Imperial City lies the General City, the home of the people. It is more densely populated than the other parts and contains the most important of the public offices, all the foreign legations, Christian missions and many other places of special note. The principal streets of the General City are unpaved and are lined with rows of shops, painted red, blue and green and decorated with curious signs of Chinese characters in gilding or gayly-painted colors. These shops are surmounted by balustrades, and there are terraces on the roofs. The dwelling houses are usually of one story, and all, from palace to hovel, have one general style of steep, concave roof.

The yellow or green tiles of the public buildings, the dragons' heads and the earthen dogs at the corners of the temples and official houses make some of the streets very picturesque. The most interesting places to be found in the General City are the Hall of the Classics, containing 172 pillared slabs of granite, having the text of all the classical books engraved on them; the Drum and Bell Towers, each over 100 feet high, which are sounded at night watches and can be heard throughout the city;



ONE OF PEKING'S GATES

The one shown is the entrance to the Forbidden City.

the Mohammedan Mosque, the chief resort of the Moslems who come to the capital; and the Temple of Emperors and Kings.

The Chinese, or Outer, City. This part of Peking was built during the thirteenth century. Here most of the mercantile business is centered. Many trades are carried on in the streets, in tents or in movable shops. Among

its important buildings are the Altar of Heaven, with its surrounding temples and shrines; the Temple of Heaven, in which the emperor at midnight in the winter solstice once offered sacrifices; and the Temple of Agriculture, near which, each spring, the emperor plowed one or more furrows to inaugurate the opening of the season. In this section are found a great powder factory, great pottery works and numerous theaters.

The manufactures of Peking are unimportant. The industries are almost entirely related to the government, only such commercial and manufacturing enterprises being carried on as are necessary to supply the wants of its population. Transportation is largely by covered carts for heavy burdens, and sedan chairs for passengers.

History. The date of the beginning of Peking is lost in antiquity. In 937 it was made one of the capitals of the kingdom set up by the Khitan Tartars, and was then called Nanking, or the Southern Capital. In 1264 Kublai Khan (which see) made it his capital and built the present Tartar City. The city was occupied by the Manchu conquerors in 1643. In 1860 it was surrendered to the English and French allies (see CHINA, subtitle *History of China*), leading to the establishment of the various foreign legations in the Inner City. Since the Boxer uprising in 1900, when foreign military forces took possession, much has been done to improve the streets and the sanitary condition of the city. According to a census taken in 1920, under direction of the Metropolitan Police Administration, Peking has a population of 924,334; it was believed before that date that it possessed over a million people. R.D.M.

Consult Favier's *The Heart of Peking;* Burton Holmes' *Travelogues.*

PELÉE, *pe la',* MONT. See MARTINIQUE.

PELICAN, *pel'i kan.* "A funny old bird is the pelican," runs the familiar limerick, alluding to its ability to "store in its beak food enough for a week." When we realize that the enormous pouch attached to its grotesque-looking bill is capable of holding several quarts of water, this statement does not seem exaggerated. It is not water it stores, however, but small fish which will later be feasted upon leisurely or fed to its young. Both young and old birds have voracious appetites. A curious sight it is to see a young pelican plunge its head deep into the parent bird's pouch and dig out the partly digested food. In motion pictures we are sometimes enabled to watch this operation. During the feeding process the pouch is pressed back against the breast, which gave rise to the ancient legend that the pelican fed her young upon her own blood, and led to the use of this bird in heraldry and medieval art as a symbol of charity, mother love and self-sacrifice. The state seal of Louisiana, nicknamed the *Pelican State,* bears the heraldic device called the *pelican in her piety.*

Nature's prime favourites were the Pelicans;
High-fed, long-lived, and sociable and free.
—MONTGOMERY: *Pelican Island.*

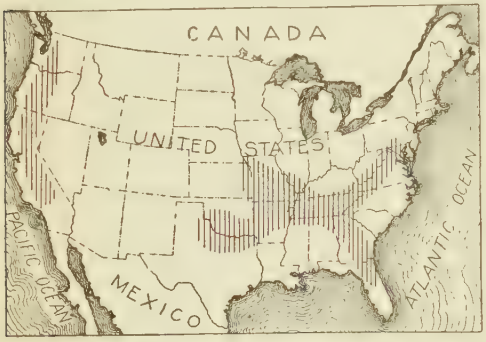
The pelican is the largest of the web-footed birds. The *American white pelican,* which weighs about sixteen pounds, has a length of five feet and a spread of eight to nine across the wings. Its plumage is snowy white, with a tinge of straw-color on breast and neck, and wings partly black. During the breeding season the male bird develops on its bill a horny, triangular projection. This species is common during the breeding season in the Mississippi Valley and Canada—particularly around Shoal Lake in Manitoba—and is occasionally seen around the Great Lakes, but in the winter it migrates to the Gulf coast and the marshy lakes of the South. Its nest is built usually on the shores of an island in an inland lake, and consists of a mound of earth, gravel and sand, roughly topped by twigs; among these twigs are laid from one to four creamy or bluish-white eggs, though most often only two.

The birds are highly sociable, living in colonies and frequently following a coöperative plan in their fishing. The white pelican does not dive for its food, as do most other varieties, but swims quietly in the shallows, darting its long, hooked bill into the water and then skilfully tossing its prey into the air and transferring it to the elastic pouch. It is a swift swimmer, and is strong and graceful on the wing but extremely awkward on land. It is when the bird is dozing after its gluttonous meal that it is most easily captured, for its drowsiness, added to its heavy body and the load of fish in its pouch, makes it difficult for it to begin flight.

Two others of the ten known species are American—the *California pelican,* and, very

similar to it, the *brown pelican* of the southern seacoast and the West Indies, which frequently penetrates as far north as the Carolinas. Pelican Island, in Indian Lake, Florida, was set aside by the United States government in 1903 as a pelican refuge, and many of the other bird reserves also harbor great flocks of these curious creatures. See BIRD, subtitle *Government Protection of Birds.* L.M.B.

PELLAGRA, *pe lag'ra,* or *pe la'gra,* from two Italian words, *pelle,* meaning *skin,* and *agra,* meaning *itching,* the name of a noncontagious disease affecting inhabitants of mountainous regions, particularly in Italy, Northern



WHERE PELLAGRA IS FOUND
The shaded sections, up to 1917, had developed the only cases of the malady.

Spain and the southeastern and extreme western parts of the United States. The disease has been known for 200 years, and although it has probably existed in the United States for some time, it was only in 1864 that the first case was diagnosed. Since the beginning of the twentieth century the disease has spread at an appalling rate, the number of victims reaching nearly 50,000 by 1917. Most of the victims are women between thirty and forty years of age. Persons afflicted with pellagra are irritable and always tired, and have continual abdominal pain and an eruption of red and black blotches.

The cause of the disease has not been satisfactorily determined; it has been attributed to corn, cornbread, cottonseed oil, sandflies and the deposit granite leaves on water as it decomposes. Modern investigators are almost certain that a one-sided diet is responsible, such as a diet of fat meat, bread and molasses; in fact, the very sort of diet a mountaineer of the poor or lower middle class is likely to have. Poor sanitation and defective drainage in homes or mills and factories seem to aggravate pellagra. In spite of the tremendous increase of the disease in the last few years, the outlook appears hopeful, for while formerly large numbers died from the malady, now eighty per cent of those who contract it when they are young fully recover. The cure is effected by restoring lean meat, peas and beans to the diet, and removing to a community where sanitary conditions are good. Injections of an alkaline character, such as sodium citrate or cacodylate of sodium, are of great benefit. As the disease tends to return after apparent recovery, victims are advised by physicians to continue treatment for several years after an attack. Successive annual attacks cause chronic pellagra. C.B.B.

Consult Goldberger and Lorenz's *Cause, Prevention and Treatment of Pellagra;* Lavinder's *The Prevalence and Geographic Distribution of Pellagra in the United States.*

PELLETIER, *pel tya',* LOUIS PHILIPPE (1857-1921), a Canadian statesman, who became Postmaster-General in the Dominion Cabinet formed by Sir Robert Borden in 1911. Pelletier was born at Trois Pistoles, Que., and was educated at Sainte Anne College and Laval University. He was called to the bar in 1880, and thereafter practiced law at Quebec. He was several times elected to the provincial assembly, and was attorney-general of the province from 1896 to 1897. In 1911 he was elected to the Dominion House of Commons by Quebec County, and was at once appointed Postmaster-General in the new Conservative Ministry. As Postmaster-General he was responsible for the establishment of a comprehensive system of rural mail delivery. He also arranged a two-cent postal rate to France, and made vigorous efforts to break the monoply of the cable companies.

PELOPIDAS, *pe lop'i das* (? -364 B.C.), a hero of Thebes, associated with Epaminondas, whom he helped to make Boeotia for a time the leading state in Greece. His youth was spent in idleness and pleasure, for he had great wealth and was of high family. Driven to Athens in 382 B.C., when the Spartan influence became supreme in Thebes, he laid plans to overthrow the usurpers, and in 379 returned at the head of a determined band, attacked the garrison and compelled the Spartans to surrender. He then set up a democratic form of government and was for several years elected *boeotarch.* He organized a Sacred Band among the young patriots, and this was of great help to Epaminondas at the battle of Leuctra in 371 B.C.; in the next year he took part in an invasion of the Peloponnesus, which resulted favorably for Thebes.

Sent as an ambassador to Macedon, he was on his return journey captured by Alexander of Pherae and held prisoner, but was rescued by Epaminondas in 367 and sent as special ambassador to the court of Persia. There he successfully defended the interests of Thebes against Athens and Sparta. In 364 he met his old enemy, Alexander of Pherae, in battle and defeated him, but in pursuing the escaping tyrant was himself cut down.

PELOPONNESIAN, *pel op o ne' si an,* **WAR,** a contest for supremacy in Greece, waged between Athens and Sparta. During the age of Pericles the allies of Athens had become dissatisfied with the heavy tribute exacted for the construction of public buildings in Athens, and only waited a chance to free themselves. Sparta, ever jealous of the glory and fame of its rival, made use of every opportunity to increase this dissatisfaction. Finally, in 432 B. C., when Athens aided Corcyra in a quarrel with its mother city, Corinth, Sparta sent Athens a message that it either must let all the Greek cities go free or must fight. Athens replied that Sparta should first set free its acquisitions in the Peloponnesus, and when Sparta refused, the war began (431 B. C.).

Sparta's plan was to ravage Attica and stir up revolts among Athenian colonies. The people of Attica, at the advice of Pericles, took refuge within the Long Walls of their city, while the Athenian fleet and army were sent to ravage the Peloponnesian coasts, and thus they avoided meeting the Spartans in open battle. This plan worked well for Athens until a plague fell upon the city and swept away more than one-fourth of the population. Pericles was among those who died, and there was no one capable of taking his place.

The turning point in the war was the Athenian expedition to Sicily, which ended disastrously for Athens in a great sea fight in the harbor of Syracuse (415 B. C.). Even after this crushing disaster, Athens refused terms of peace that should limit its empire and strained every nerve to build and man new fleets. But in 405 B. C., the last Athenian fleet was destroyed at Aegospotamos, and in the next year the city of Athens surrendered. See GREECE, subtitle *History.*

PELOPONNESUS, *pel op o ne' sus,* the ancient name of Morea, the southern peninsula of Greece, separated from the mainland by the Corinthian and Saronic gulfs, with a connecting link in the narrow Isthmus of Corinth. The peninsula derived its name from *Pelops* and *nesos,* meaning the island of Pelos, son of Tantalus, king of Phrygia. In ancient days the Peloponnesus was divided into six districts, Messina, Argolia, Laconia, Elis, Arcadia and Achaea. Among these states almost perpetual war was waged until the Roman conquest in 146 B. C. See GREECE, subtitle *History;* PELOPONNESIAN WAR.

PE' LOPS, in Greek myth, was the son of Tantalus. Tantalus at one time gave a feast to the gods, and served his son Pelops as the chief dish. The gods, however, recognizing what was set before them, declined to eat, and restored Pelops to life. He married Hippodamia, and was the father of Atreus and Thyestes. The Peloponnesus took its name from him. See TANTALUS.

PEL' VIS, a strong, bony cavity between the spinal cord and the legs, which holds the rectum, bladder and other organs, and serves as a support for the spine. *Pelvis* is the Latin word for *basin,* a term which somewhat aptly describes its shape. The front and side walls of this basin are formed by the two hip bones, which are so irregular in shape that physiologists have named them the *ossa innominata,* meaning *bones without a name.* In the back is an opening between the hip bones, which is filled in with a triangular bone called the *sacrum;* the sacrum lies below the lowest vertebra and above the *coccyx,* or tip of the spine. The floor of the pelvis consists of soft tissues, and the whole cavity is supported by the two thigh bones. See SKELETON, for illustration.

PEM' BERTON, JOHN CLIFFORD (1814-1881), an American military leader, who, though Northern born, cast in his lot with the Confederacy and became one of its generals. He was born in Philadelphia, was graduated at the United States Military Academy at West Point in 1837, and entered the Federal army as second lieutenant. He served with distinction against the Indians and in the Mexican War, and was commissioned captain in 1850. At the beginning of the War of Secession he entered the Confederate service, and was chief in command during the memorable defense of Vicksburg. Though he defended the city with energy and skill against the Federals under General Grant, he was forced to surrender on July 4, 1863, giving up 30,000 men and vast stores of ammunition. He then resigned from the army, and after the war resided in Virginia and in Pennsylvania.

PEMBROKE, a town in Ontario, the county town of Renfrew County. It is situated on the

south shore of Allumette Lake, which is an expansion of the Ottawa River, and is 105 miles by rail northwest of Ottawa. It is served by the Grand Trunk and Canadian Pacific railways. Pembroke has ample water power for many industries, including the manufacture of many lumber and iron products. Chief among these are box shooks, building and lumbering tools, leather, gloves, moccasins, stoves, incubators, carriages and steel in various forms. The town has a large outside trade in lumber in addition to the large amounts used in local industries. Woolen goods, bricks and building materials are also important manufactures. The fine municipal building, the two hospitals, the public library and the convent boarding school are worthy of special mention. Population in 1911, 5,626; in 1921, 7,875.

PEMMICAN, *pem'i kan,* a North American Indian name for a food which contains the greatest quantity of nourishment in the most compact form. Originally it was prepared by drying and powdering the lean meat of the buffalo or deer. This was then seasoned with berries and stirred into boiling fat, after which it was dried in cakes. Beef is now used instead of buffalo or venison. Since pemmican will keep indefinitely unless reached by moisture, it is serviceable to explorers and those making long expeditions into uninhabited regions. Peary and Cook relied upon it on their arctic voyages. It is similar to the *tassago* of South America and the *biltong* of Southern Africa.

PEN. Before the invention of the steel pen various instruments were used for writing. The Romans used a *stylus,* made of bone or metal and pointed at one end, for engraving characters on tablets of wax. Some people painted letters with a fine brush, as do the Chinese today. Pens made from reeds were used for writing with ink on papyrus (which see); later it was discovered that better pens could be made from the quills of certain birds, those from the goose, the swan and the crow being the best for the purpose. Soon after this discovery quill pens came into general use in Europe, and they were universally employed in America until the advent of the steel pen. The schoolmaster of that day had to know how to mend his pupils' pens as well as how to teach penmanship. A small pocketknife with a thin, narrow blade designed especially for this purpose and called a *penknife* formed a necessary part of his equipment. The Latin word for quill was *penna,* or *penne,* and from this we derive the name *pen.* Quill pens were considered satisfactory, but they wore out quickly, and pens of a more durable material were needed.

Steel Pens. We do not know who invented the steel pen, but the manufacture by machinery was begun in England some time between 1820 and 1830. The leaders in the enterprise were John Mitchell, Joseph Gillott and Josiah Mason. From this beginning the manufacture of Gillott pens, now known all over the world, was developed. England takes the lead in the manufacture of steel pens, but their production in America is increasing.

The making of a steel pen is explained below, and nearly all the work is done by machinery. Cast steel of the best quality is used.** This is obtained from England and Sweden and comes to the manufacturer in the form of thin sheets about six feet long and seventeen inches wide. The plates are cut into strips which are placed in air-tight boxes and heated to a dull red, then allowed to cool slowly. These strips are then rolled to the required thickness, a process requiring great skill, since a variation in thickness of even one-thousandth of an inch renders the strip worthless.

Pens called *blanks* are cut from these strips with dies. The hole at the base of the nib and the lateral slits are then cut with another die, and the name of the factory and other lettering are stamped on the blank. The pens are still flat, and work on them has made the steel so hard that another heating becomes necessary. After this second heating the pens are stamped into shape in a press. Tempering is done by heating the pens to a bright red and immersing them in oil, then rolling them in cylinders over a charcoal fire. The pens are polished by rolling them for several hours in a barrel of ground iron and then in another of sawdust. When this operation is completed the pens are of a bright color, resembling polished steel. The points are then ground to make them write smoothly, and then the slit is cut in the point. This is the last and most delicate operation. The edges of the slit are polished by rolling the pens for several hours with powdered iron. Pens having a brown color are bronzed to protect them from the ink, which corrodes steel. The world's annual output of steel pens is estimated to be from ten to twelve million gross, of which two and a half million gross are produced in the United States.

Other Varieties of Pens. Gold pens, which are made in much the same way as steel pens, are valued especially because of their durability

and flexibility. The expense of manufacture has been lessened by the substitution of iridium for diamonds and rubies in making tips for the points. Such tips are a protection against wearing on the part of the points. Gold pens are used exclusively in fountain pens, which have in the holder an ink barrel that feeds the point automatically. The stylographic pen is a variety of fountain pen in which a needle at the end serves as a valve to release the ink when the point is pressed on the paper. The electric pen, one of Edison's latest inventions, consists of a small perforating instrument connected with an electric battery and used in the manner of an ordinary pen. A series of minute holes is punched in the paper, thus making a stencil that can be used to reproduce the letters or drawings traced by the pen. W.F.R.

PENANCE, *pen'ans,* a sacrament in the Roman Catholic Church, by which repentant sinners make atonement for offenses, upon the three conditions of *confession, contrition,* accompanied by a firm purpose of amendment, and *satisfaction,* with the absolution of the priest. The firm purpose of amendment is necessary, as it proves the sincere contrition, and the satisfaction is the atonement by prayer, almsgiving or self-denial. It was instituted from the words of Jesus (*John* XX, 23), "Receive ye the Holy Ghost; whose sins ye shall forgive they are forgiven them; whose sins ye shall retain they are retained." See Roman Catholic Church. G.W.M.

PENANG, *pe nang',* an island in the British Straits Settlements, at the northern entrance to the Malacca Strait, off the northwest coast of the Malay Peninsula. The island is of great commercial importance, being second only to Singapore, the chief port, in the Straits Settlements. The capital is Georgetown, with a fine harbor and annual shipping of nearly 5,000,000 tons. The principal exports are tin, sugar, spices and rice. The area of Penang is about 107 square miles, the population being chiefly Chinese and Tamils. The jungle still covers considerable portions of the island, but when cleared, the soil is fertile. The total population of the island was about 200,000 in 1921; only 1,160 were Europeans and Americans, who are there for commercial or governmental reasons only.

The settlement of Penang politically embraces the island of Penang, officially called Prince of Wales Island, the Province of Wellesley and the Dindings. The population of the entire district is 304,572.

PENATES, *pe na'tecz.* See Lares and Penates.

PENCIL, *pen'sil.* A piece of lead when drawn across paper leaves a dark-gray mark. The ancient Egyptians discovered that lead would mark on papyrus (which see), and they used it for such purpose many centuries ago. The Romans also knew of this peculiarity of lead, and they made small rods of it which they used for marking and writing. Then a substance that made a blacker mark was found, and it was called black lead. This substance was *graphite* (which see), and for a long time it has been used for the "leads" in so-called lead pencils, which contain no lead whatever.

How Manufactured. The lead pencil of commerce consists of a rod of graphite mixed with pipe clay and enclosed in a wooden case. The best graphite in the United States is found in the mines at Ticonderoga, N. Y. It is ground and separated according to its degrees of fineness by being floated in water in a series of tanks, so arranged that the water flows from the top of one tank to the next below it. The coarsest settles in the first tank, the next grade in the second, and so on until the last tank, which contains the finest grade, is reached. The powdered graphite is then mixed with ground pipe clay, the proportions depending upon the degree of hardness required in the pencil. Equal parts of clay and graphite make a hard pencil.

An ordinary pencil has seven parts clay to ten parts graphite. A soft pencil has a still larger proportion of graphite. The clay and graphite are ground together until they are thoroughly mixed and the mixture has the consistency of dough. It is then put into an iron cylinder, whose lower end is perforated with holes of the size required for the leads. An iron piston, pressed down upon the mass by means of a screw, forces it out through these holes, forming the leads, which are coiled like wire on a table. The leads are immediately straightened and cut into lengths suitable for two pencils. They are then thoroughly dried and are ready for the cases.

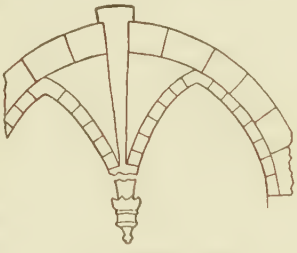
The cases of the poorest grades of pencils are made of pine; those of the best grade of red cedar. Most of the work on the cases is done at the lumber mill. They are sent to the manufacturer in the shape of blocks, each block being large enough for six pencils and containing six grooves for the leads. The grooved face of one of the blocks is coated with glue, the leads are laid in the grooves, and another grooved block

is placed on the first. Quantities of these blocks are placed in a press and left to dry under great pressure. When taken from the press the ends of the blocks are finished; then they are run through a machine with rapidly revolving knives which cut them into pencils. Pencils of the highest grades are stained and varnished and stamped with the name of the maker and a number or letter indicating the degree of hardness. All the work is done by machinery.

The leading countries in the manufacture of lead pencils are Germany, England and the United States. All the great pencil factories in America are located in and around New York City. The annual output is valued at about $7,379,000. It is sufficient to supply the home market and allow the shipping of a large number of pencils to foreign countries, where American pencils are highly appreciated.

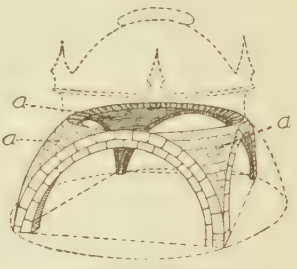
Other Pencils. Slate pencils are made of soft slate and may be incased in wood, but most of them are small rods of slate. Colored pencils are made by mixing coloring matter with clay or wax and enclosing the pencil in a wooden or a paper case. Pencils for marking on crockery or glass are made of wax colored with lampblack or ivory black.

PEN'DANT, in architecture, an ornament hanging from the ceiling or the pillar of a building. Pendants usually hang from vaults or domes, but in wooden buildings they may hang from the rafters or girders. In some buildings having the roof supported by arches, they hang from the arches (see illustration). Pendants formed a special feature of ancient Oriental architecture, especially that of the Indians, Persians and Saracens, who made them of stone and gave them considerable ornamentation. They were introduced into Europe in the Middle Ages, and fine examples are found in the cathedrals and chapels dating from that period. Those in the chapel of Henry VIII, Westminster Cathedral, London, are among the finest in the world. The pendant is but little used in modern architecture.



A PENDANT

PENDENTIVE, *pen den' tiv.* Cut an orange crosswise through the center and remove the pulp from one of the halves, taking care not to break the peel. Cut a section from the part of the peel that forms the top when the rim of the peel rests on the table. Mount the part remaining after cutting off the top in four vertical standards, so placed that they will form the corners of a square. Run a thread from the top of each standard to the circle at the top of the orange peel, so placing them as to divide this circle into four equal parts. The triangular segments of the orange peel marked off by these threads represent what in architecture is called a *pendentive.* That is, a pendentive is the triangular segment of a hemispherical dome formed by arches extending from the four pillars upon which the dome rests to the circumference of the circle formed by cutting off, as it were, the top of the dome. From this smaller circle as a foundation, a second and smaller dome rises. The pendentive is one of the chief characteristics of Byzantine architecture, and the finest example of it is in the Mosque of Saint Sophia in Constantinople. See ARCHITECTURE, page 325.



PENDENTIVES

(*a*) Pendentive. Dotted lines show completion of superstructure.

PEN'DULUM, a weight so suspended as to swing freely in response to the pull of gravity. A bit of metal, suspended from a fixed point by a string and allowed to vibrate, will illustrate the principle. When Galileo timed the movements of a swinging lamp by his pulse beats and noted that the vibrations were made in equal time, he discovered a fact of great practical value, which resulted later in the making of clocks.

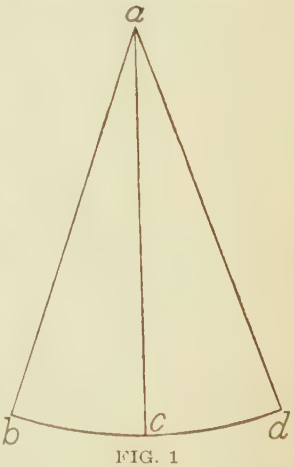


FIG. 1

The movements of the pendulum to and fro are called *vibrations,* or *oscillations,* and the path it traverses is called the *arc.* The time occupied in passing over this arc is the *period,* or *time, of oscillation.* The angle measured by

half the arc is known as the *amplitude of oscillation.* In Fig. 1, *b d* is the arc through which the weight *c* swings, and *b a c* is the amplitude of oscillation. A pendulum about 39.1 inches long will vibrate once each second in the latitude of New York. The shorter the pendulum the more frequent are the vibrations, if the amplitude remains the same.

There are four laws of the pendulum, stated as follows:

(1) The time of vibration is independent of the mass.

(2) In the same pendulum, all vibrations of small amplitude are made in the same time.

(3) The time of vibration varies directly as the square root of the length. A pendulum one-ninth the length of another will vibrate three times as fast.

(4) The time of vibration varies inversely as the square root of the acceleration, or force of gravity.

In general, the time of vibration decreases as the pendulum is moved from the equator toward either pole.

The simple, or ideal, pendulum, a weight suspended from a thread (shown in *a*, Fig. 2), could not be used for a clock, because the thread would not be stiff enough to set in motion other portions of the mechanism. A practical pendulum, therefore, is usually of the form shown in *b*, Fig. 2; it consists of a flattened bob supported by a rod, with a screw beneath the bob to adjust the length of the pendulum. The pendulum is lengthened when the clock runs too fast, and shortened when it runs too slow.

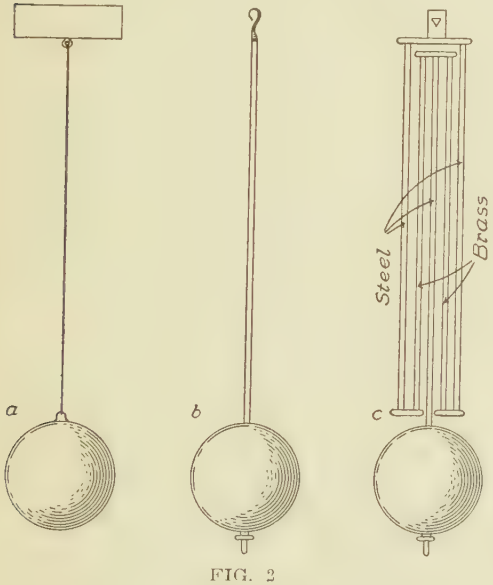


FIG. 2

Since the rod in a clock pendulum tends to expand in summer and shorten in winter, clocks known as *regulators* are supplied with so-called *gridiron* pendulums, consisting of several brass and steel rods so attached that some expand upwards and some downwards, thus keeping the mean length constant (see *c*, Fig. 2). In another device the length is kept constant by the expansion and contraction of mercury in a cup which swings at the end of the rod, in place of the ordinary weight. See CLOCK.

PENELOPE, *pe nel' o pe,* a Grecian princess who, according to the old myth, became the wife of Ulysses about the same time that Helen, her cousin, was married to Menelaus. Soon after the birth of Telemachus, Ulysses left Penelope to go with the Greeks to the Trojan War. For twenty years he did not return, and during this long absence Penelope was persecuted by aspiring and persistent suitors, who endeavored to convince her that the long absence of her husband meant his death. She succeeded in keeping them at a distance and in deferring her decision, telling them that as soon as she had completed a web which she was weaving she would give them an answer; but each night she unraveled what she had woven during the day. After a time, however, she was detected in this and driven to make a decision. Accordingly, she promised to marry him who could bend and use successfully the massive bow of Ulysses. All tried and failed excepting a beggar who had come into the hall among the spectators. This man succeeded with little apparent effort, and was then recognized as Ulysses himself, who had just returned to his kingdom. The hero then turned his arrows upon the troublesome suitors and slew them one after another.

Related Subjects. The reader is referred to the following articles in these volumes:

Helen of Troy — Troy
Menelaus — Ulysses

PENETANGUISHENE, *pen e tan' gish een',* a town in Simcoe County, Ontario, at the southeastern end of Georgian Bay, on the Grand Trunk Railway, 102 miles north of Toronto, thirty-six miles northwest of Orillia and thirty-eight miles north of Barrie. Penetanguishene is the mecca of thousands of American and Canadian tourists who make annual pilgrimages to Georgian Bay in search of health and pleasure. It has a deep yet snug harbor which is surrounded by beautiful hills. Its name is an Indian word, meaning "white, rolling sand," which tells the story of its attractive

beaches. Penetanguishene is also important for its manufactures, which include lumber, boxes and box shooks, shingles, tubs, fiber board, gasoline boats and engines, stoves, carriages, flour and other articles. Population in 1911, 3,568; in 1921, 4,037.

In the seventeenth century Penetanguishene was one of the principal Jesuit missions in Canada. Later it became a fur-trading station and military post. After the War of 1812 its military importance declined, and it became known as a lumbering center. It was incorporated in 1881, and since 1911 has owned its electric light and power system. W.F.B.

PENGUIN, *pen'gwin,* an odd-looking bird of the Antarctic regions, having short legs, short wings covered with stiff, scalelike feathers, a ducklike body and a very short tail. There are about fifteen species, varying in length from

PENGUINS

eighteen inches to three feet. The large king penguins have grayish-blue body plumage, white breasts, black heads and yellow throats. These birds are built for swimming and diving rather than for flying. In the water they use their short wings as oars and their webbed feet serve as rudders; on land they waddle about in an erect position, or awkwardly crawl around on the ground, using the wings as forefeet.

They live in colonies. Sometimes the eggs are laid in crude nests of sticks, stones and grass, and sometimes on the bare rock. Usually but one egg is laid, and the bird hatches it by holding it between the thighs. The male shares with the female the work of hatching. Though the penguins live in cold regions and seek their food in icy waters, they do not suffer from the low temperature, as they are kept warm by a layer of fat under the skin. On the breast the plumage is soft and silvery, and furriers use these feathers in making muffs and collars.

Amundsen, the Antarctic explorer, made an interesting study of these birds. He found them intelligent, and quick to imitate the motions of human beings, whom they had never seen before, and of whom they were not afraid.

Consult Levick's *Antarctic Penguins;* Darwin's *Voyage of a Naturalist.*

PENMANSHIP. The importance of being able to write legibly with ease and with a good degree of rapidity can scarcely be estimated. While the public schools give instruction in penmanship that is designed to make satisfactory penmen of the pupils by the time they have completed the sixth grade, many boys and girls by force of circumstances are compelled to leave school before they have become good writers. It is possible for anyone in such circumstances to become a fairly-good penman, unless he is handicapped by some physical defect. To accomplish this three things are necessary—the determination to succeed, practice and perseverance.

Underlying Principles. Including capitals, small letters and figures, there are sixty-one characters that one must learn to make. Even were each character entirely different from the others, the task would not be so very difficult, but it is in fact quite simple. All these characters are formed by the combination of two simple elements—the straight line and the oval. Sufficient practice in making and combining these elements will enable one to become a good penman, provided the practice proceeds systematically, with the following points in view:

1. **Form.** Writing is a form study, and anyone seeking to become a good writer should have a clear mental image of the characters he is to make. A study of good script is therefore one essential to successful practice. Any good series of copy books will furnish this material.

2. **Freedom.** By freedom is meant that facility of movement which will enable one to write freely, legibly and with a good degree of rapidity without thinking of the characters he is making. When this stage of development is reached one need not give further special attention to his penmanship.

Directions. Freedom is gained through practice, but the practice must be of the right kind. No one will become a good writer by merely copying the forms of letters and figures. Such training of the muscles employed in writing as

will give control over the movements of the hand and arm in the formation of these characters is the foundation of all good penmanship. It is therefore essential that one desiring to improve his penmanship should make a right beginning.

1. **Position.** Sit squarely in front of the desk and turn the paper so that the front edge will form an angle of about forty-five degrees with the edge of the desk. Sit fairly erect, with both feet on the floor.

2. **Holding the Pen.** Fig. 1 shows the correct method of holding the pen. The penholder should point to the shoulder, and the forearm should rest upon the muscles between the wrist and the elbow. The tips of the third and fourth fingers should rest lightly on the paper.

POSITION OF HAND

3. **First Set of Exercises.** Remember that all practice is for the purpose of gaining freedom and accuracy of movement. With the pen in hand, but without ink, slide the hand over the paper from left to right and back, allowing the third and fourth fingers to rest lightly upon the paper. Dip the pen in ink and make lines like those in Fig. 2. This movement should be made entirely by the arm.

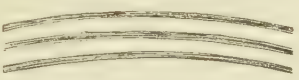


FIG. 2

This exercise should extend in one broad sweep across the sheet. Paper that has already been written on may be used, as a matter of economy.

The second exercise consists in what is sometimes called the "push and pull" movement and results in slanting straight lines as shown in Fig. 3.

FIG. 3

Write first the height of two entire lines on the paper, then the height of one line.

The third exercise is a combination of the first and second in the making of the oval, as illustrated in Fig. 4.

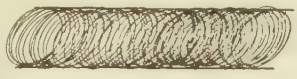


FIG. 4 (*a*)

Write in space of two lines, then in space of one line.

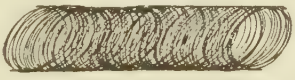


FIG. 4 (*b*)

To be written both in double space and in single space.

These exercises all require large movements, because the correct movement is acquired much more easily by beginning in this way. Continued practice will enable one to bring these movements down to space required for legible and rapid writing.

4. **Second Set of Exercises.** The first exercises constitute the first step towards the desired end. The next step consists in combining these movements, as in the formation of the oval (Fig. 5). After covering a page or two with ovals made by the direct movement, make a page of ovals by reversing the movements, letting the

FIG. 5

downward stroke form the right side of the character.

Resort again to the sliding movement from left to right and back, but form straight lines instead of curves. This is more difficult than the first exercise. See Fig. 6.

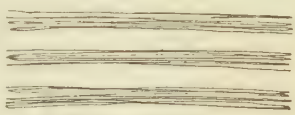


FIG. 6

Draw pen entirely across page for first practice, then shorten the strokes.

5. **Third Set of Exercises.** The third step consists in combining the movements already practiced in the formation of letters. Fig. 7 shows how the *C* is formed from the oval. The small loop should be made with the finger movement. In Fig. 8 the oval is transformed into the *E*. *A* is a combination of the oval and the straight line (Fig. 9). The loop and the oval are the basis of capital *S*. (Fig. 10).

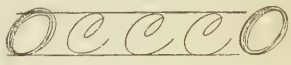


FIG. 7

FIG. 8

FIG. 9

Enough illustrations have been given to show one how to train himself in penmanship. The same movements and principles apply to the formation of both capitals and small letters. It is a good plan to practice each exercise for a

FIG. 10

few minutes every day, since this gives the muscles daily training. Such a plan will lead to more rapid advancement than will longer periods devoted to the work once to twice a week. W.F.R.

PENN, William (1644-1718), the founder of Pennsylvania, and the world's best-known member of the Society of Friends, or Quakers, was born in London, October 14, 1644. His father was one of the most famous of English admirals and was able by his wealth and influ-

ence at court to give the boy every advantage in education and to start him on the road to political advancement. While William was attending school in Essex, he came under the religious teachings of the Puritans and began to lead a life of unusual strictness. At the age of sixteen he entered the aristocratic Christ College in Oxford University, but so disliked the Episcopal form of worship that he tore the surplices from the backs of the students. An English Quaker, Thomas Loe, completely converted him to the Quaker beliefs, and the boy left college in disgust over what he called the "popish" ceremonies.

WILLIAM PENN

As the honored founder of a great colony he did not in his dealings with savages abuse the strength he derived from civilized standards. As a lawgiver for that colony, in an age of religious persecution, he made religious liberty the corner stone of his civil structure.

He announced to his father that he was a Quaker, and was promptly driven from the house. His mother interceded for him, and his father sent him to France and Italy, in the hope that the fashionable life abroad might cure him of his religious zeal. He returned with every sign of Quakerism gone, and his happy father gave him the responsible position of manager of several large Irish estates. Again, however, he met Loe, and became once more a Quaker, this time never to backslide. Penn began to preach, refused to take off his hat to the king, and wrote such radical pamphlets denying orthodox views on the Trinity that he was imprisoned in the Tower of London for eight months. There he wrote *No Cross, No Crown,* one of the noblest English books on Christianity.

The death of his father in 1670 made him a wealthy man, but he continued his daily preaching and once more was confined in the Tower for addressing unlawful congregations. Release came soon, however, and he visited Germany, where he became acquainted with many citizens of liberal religious views. This accounts mainly for the great number of German settlers in Pennsylvania a few years later. In 1675 Penn bought from a Quaker a large part of Western New Jersey, and found members of the persecuted sect so eager to seek refuge there that he petitioned Charles II to repay in American land an old debt that had been due his father. The king granted him the territory now comprising Pennsylvania and part of Maryland, and gave him absolute power to rule it as he wished. He opened the land for colonists and they emigrated by thousands. *A Frame of Government* was written by Penn as a code of laws, and this is still regarded as one of the most liberal charters, or constitutions, ever issued. His treaties with the Indians were so fair and generous and were so strictly kept that for more than a century very few redmen would attack a Quaker. Prosperity resulted from every venture the colonists made, and their principal town, Philadelphia ("City of Brotherly Love"), grew with astonishing rapidity.

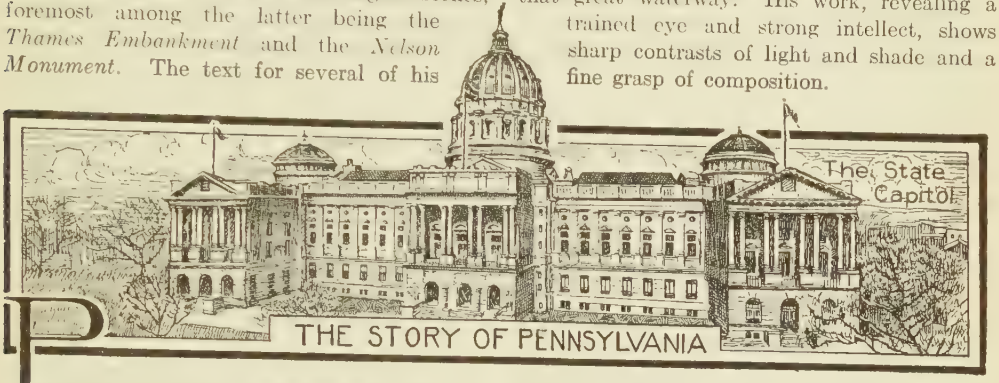
Penn was a great favorite with Charles II and James I, who admired his courage and smiled good-naturedly over his "thou" and "thee" style of talking; but when William and Mary came to the throne Penn found himself suspected of various plots against the government, chief among which was a charge of attempted bribery in connection with pardons. For three years he was in hiding in London, while dissension aroused by other religious sects than his own threatened to ruin the Pennsylvania colony. In 1693, however, he was declared innocent of conspiracy, and in 1699 he again visited Pennsylvania. He soon adjusted all troubles and wrote a constitution which was so wise and liberal that the people used it until the colony became a state.

In 1701 the plan of King William to declare Pennsylvania a royal province caused Penn to return quickly to London. There false claims for debts were pressed against him so harshly that he allowed himself to be thrown into Fleet Prison rather than pay them. This confinement shattered his health, and when he was released in 1709 he no longer possessed the spirit of former days. In 1710 he suffered a stroke of paralysis, but lived until July 30, 1718. These last years were brightened somewhat by the colonists' belated appreciation of his work for them and by the extraordinary growth and prosperity of Pennsylvania. Statues to his memory stand in Philadelphia and New York. E.D.F.

Consult *Penn's Memoirs,* edited by Clarkson; Fisher's *The True William Penn;* Hodges' *William Penn;* Grant's *Quaker and Courtier, the Life and Work of William Penn.*

PENNELL, *pen'el,* Joseph (1860-), an American etcher, illustrator and author. He

received his early training at the Pennsylvania Academy of Fine Arts in Philadelphia, where he was born. In 1884, after an extended tour of Europe, he and his talented wife, Elizabeth Robins Pennell, settled in London, where they began their literary and artistic work. Pennell has shown the picturesque possibilities of old Philadelphia in a series of etchings, and has executed many notable Italian and English scenes, foremost among the latter being the *Thames Embankment* and the *Nelson Monument*. The text for several of his series was written by his wife, and *The Authorized Life of J. McN. Whistler* is their joint work. He has furnished illustrations for William Dean Howells' *Tuscan Cities*, an edition of Irving's *Alhambra*, Henry James's *Italian Hours*, and other notable books. In a series of etchings, entitled *Pictures of the Panama Canal*, he has pictured with wonderful fidelity that great waterway. His work, revealing a trained eye and strong intellect, shows sharp contrasts of light and shade and a fine grasp of composition.



THE STORY OF PENNSYLVANIA

PENNSYLVANIA, *pen sil va' ni a*, one of the thirteen original states of the American Union, the southernmost and second largest state of the North Atlantic group. It is the leading mineral state of the Union, and one of its most important industrial and commercial commonwealths. Conspicuous from its earliest beginnings as the seat of civic, social and religious freedom, and playing an important part in the establishment of the Union, Pennsylvania has continued to hold a prominent position in the development and progress of the nation.

The state was named for its founder, William Penn, who with Quaker modesty wished it to be known merely as "Sylvania," meaning *woodlands;* however, to this name Charles II, who granted the territory to Penn, prefixed the Quaker's name, making it *Penn's Woods*, or *Penn's Woodlands*. Pennsylvania is popularly known as the KEYSTONE STATE, probably because of its position at the top of the arch formed by the Atlantic states from New England to North Carolina.

Size and Location. Having a rectangular area of 45,126 square miles, of which 294 square miles are water surface, Pennsylvania ranks thirty-second in size among the states of the Union. It is almost equal in area to the states of Maine, Massachusetts and Connecticut combined, and is more than twice the size of Nova Scotia. All of the boundaries of the state except the Delaware River on the east, a strip of forty miles on Lake Erie and a small arc separating the state from Delaware, on the southeast, are straight lines.

People. According to the census of 1920, Pennsylvania's population, numbering 8,720,017, was greater than that of any other state in the Union but New York. This number shows an increase of 13.8 per cent since the preceding census, and that the steady growth in population has continued is shown by the fact that the estimated number of inhabitants January 1, 1917, was 8,591,029. The average density of the population in 1920 was 194.5 persons to the square mile, which is over five times the average for the United States, and exceeded in only five states in the Union. The negro population, numbering about 284,500, is larger than that in any of the other Northern states.

Owing to its central location, liberal government and religious toleration, the colony of Pennsylvania became a haven for Europeans, principally religious refugees from England, Ireland, Sweden, and especially Germany; the early population probably showed a greater mixture of nationalities than did that of any of the other original states. Many of the sects, such as the Quakers, Mennonites, Moravians and Dunkers, have preserved their quaint and peculiar customs, and are still found in many communities. The peculiar dialect of the "Pennsylvania Dutch," those industrious German farmers who were among the early settlers, is still heard in some rural districts, and their descendants are widely scattered through

the Middle West. Probably the most important of the foreign settlers were the Scotch-Irish, who were the dominant influence in Pennsylvania during the Revolution.

The state has a large foreign population today, owing to the great mining and manufacturing establishments, many of which employ a large percentage of immigrants. The Austrians, Russians, Germans, Italians and Irish are most numerous; the total number of inhabitants of foreign birth and foreign parentage exceeds 3,240,000.

Over sixty per cent of the population is urban, and two of the first ten cities in the United States are in Pennsylvania, Philadelphia ranking third and Pittsburgh ranking eighth in population among the cities in the Union. Other cities with over 50,000 inhabitants are Scranton, Reading, Wilkes-Barre, Erie, Harrisburg, Johnstown, Altoona and Allentown.

Owing to the large foreign population, over one-third of the inhabitants are adherents of the Roman Catholic Church. The Quakers and some of the German sects still exist, but the largest of the Protestant denominations are the Methodist, Presbyterian, Lutheran, Baptist, Reformed Church, Episcopal and United Brethren.

Education. From its earliest period, Pennsylvania made wise provision for public education, for in his "Frame of Government," William Penn provided that children under twelve years of age should be taught a trade. The first free schools were opened in 1767, but public schools were unpopular because only those pupils whose parents confessed extreme poverty could be educated without payment of tuition fees. It was only after a bitter struggle in the state senate that the present splendid system of public schools was adopted in 1835.

Education is compulsory, and the illiteracy, averaging 5.9 per cent, is greatest among the foreign born. The school system is administered by the superintendent of public instruction, who is appointed by the governor, and by a state board of education. In 1913 vocational courses were established in certain schools.

The state maintains normal schools at West Chester, Millersville, Kutztown, East Stroudsburg, Loch Haven, Indiana, California, Mansfield, Bloomsburg, Shippensburg, Slippery Rock, Edinboro and Clarion; the Pennsylvania State College is at State College. The great University of Pennsylvania at Philadelphia is an endowed institution, and receives little state aid. Among the many private coeducational institutions of higher learning are the University of Pittsburgh at Pittsburgh; Lafayette College at Easton; Lehigh University at South Bethlehem; Swarthmore College at Swarthmore; Dickinson College at Carlisle; Washington and Jefferson College at Washington; Franklin and Marshall College at Lancaster; Temple University at Philadelphia; Ursinus College at Collegeville; Haverford College at Haverford. There are many separate colleges for men and women and numerous professional schools. One of the finest women's colleges in America is at Bryn Mawr, and the Carnegie Technical University at Pittsburgh is one of the leading scientific institutions in the country. The United States school for the higher education of Indians, at Carlisle, was abandoned in 1918.

Institutions of Charity and Correction. Pennsylvania is among the most progressive states in the study of the welfare of the dependent classes. In 1915 a committee on the welfare of the feeble-minded was organized to work in coöperation with the national committees on health, hygiene and feeble-mindedness. Institutions for the defective and criminals are controlled by a state board. They include a hospital for the criminal and insane at Fairview; asylums for the insane at Allentown, Danville, Harrisburg, Norristown, Warren and Wernersville; an institution for deaf children at Philadelphia; the Pennsylvania Oral School at Scranton; an institution for the feeble-minded at Polk; penitentiaries at Philadelphia and Pittsburgh; an industrial reform school at Huntington; a reformatory at Morganza; a soldiers' and sailors' home at Erie.

Physical Features

The Land. Eastern and western Pennsylvania are separated by the parallel, even-crested ridges of the Appalachians, which sweep across the state from northeast to southwest. In these mountains, ranging from 1,000 to 2,000 feet in height, there are no lofty peaks, for they are of the rolling variety, but between their wooded slopes there are deep, fertile valleys. Although the mountains in Pennsylvania are lower than those of the same system in the neighboring states, their uniform elevations are broken by no continuous, open gap such as the Mohawk Valley in New York. The Delaware, Schuylkill, Lehigh and Susquehanna rivers have

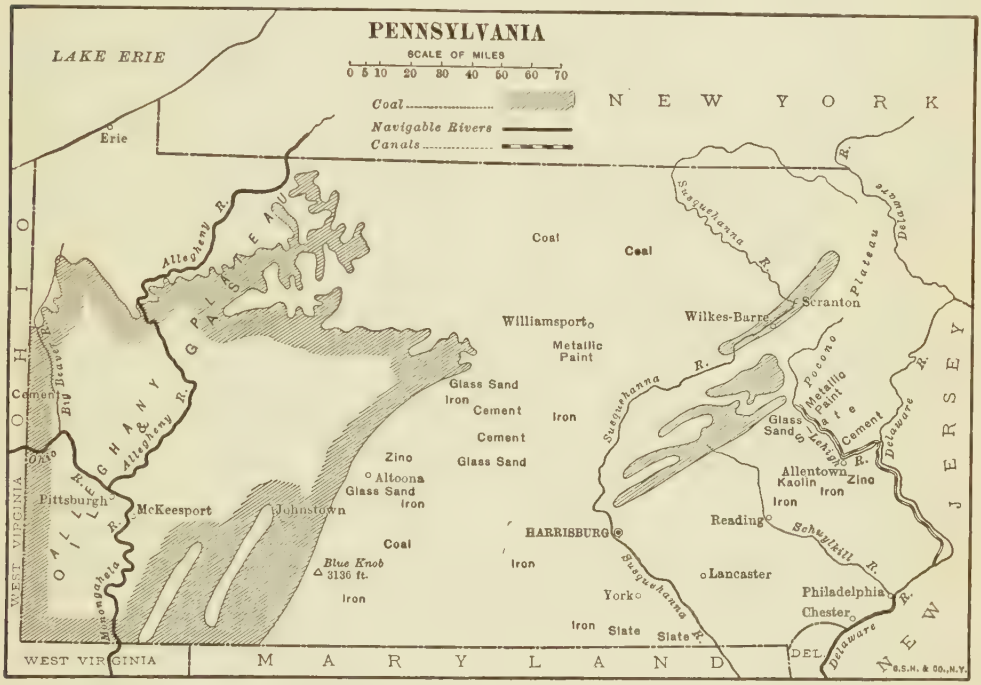
cut their way through the ridges, making picturesque V-shaped notches, famous for their beautiful scenery. The most noted of these is the Delaware Water Gap, made by the Delaware between the Blue Mountains of Pennsylvania and the Kittatinny Range in New Jersey.

At the foot of the steep eastern slope of the Blue Mountains, and extending to South Mountain on the east, lies the Lebanon, or Cumberland, Valley, known also as the "Great Valley," a section of that region of fertile gardens which extends from the Hudson River to Alabama.

hundred feet high, which extend along a narrow beach.

An interesting feature of Pennsylvania's surface is the *terminal moraine*, which enters from New Jersey and with many bends and turns crosses the state in a general northeast direction. It is a continuous mound of gravel and rocky deposits, marking the southern limit of the great glacier which once covered the northern part of the continent (see GLACIAL PERIOD).

Lakes and Rivers. In the glacial area north of the terminal moraine there are numerous



OUTLINE MAP OF PENNSYLVANIA

Showing boundaries, navigable rivers, principal cities, location of mineral deposits and the highest point of land in the state.

The Older Appalachian Belt, lying east of the Blue Mountains, is a region of undulating hills, green and gold with crops, among whose fertile slopes nestle the comfortable homes of some of the most prosperous and best-educated farmers in the world.

Beyond the mountain ranges to the west and north lies the Alleghany plateau, a rugged, forested region intersected by narrow valleys. It was this formidable table-land and the unbroken ridges of the Appalachians that shut out Philadelphia from a great share of the early trade with the Middle West. The small, triangular section on Lake Erie is a fertile plain bounded by bluffs of sand, fifty to one

kettle-hole lakes. Among these small, deep bodies of water are Lake Poponoming and Mineola and Deep lakes. There are no large lakes in the state.

Pennsylvania is drained by many beautiful rivers, the three great systems being the Susquehanna, Delaware and Ohio. The Potomac drains a small area in the south and the Genesee River enters the northern part of the state from New York. A few small streams in the northwest flow into Lake Erie.

The wide, shallow Susquehanna, winding across Pennsylvania from north to south, drains nearly one-half of the state. This stream, filled with islands and rapids, is not navigable, but

it furnishes power for many factories. Its largest tributaries are the Juniata, noted for its beautiful valley, and the West Branch. The Delaware is navigable for seagoing vessels as far as Philadelphia and for small boats up to Trenton, N. J. It is fed by the Lehigh and the Schuylkill and many smaller streams. The Ohio, the Allegheny and the Monongahela are of great importance in the industrial development of the western part of the state. The two latter rivers have been deepened, and by means of a series of locks and canals have been made navigable for many miles. In the "pools" formed by their dams, great fleets of coal boats find harbor, and hundreds of these freighters carry coal from Pittsburgh and other points to the Gulf by way of the Ohio and the Mississippi rivers.

Many beautiful waterfalls descend over rocky ledges and boulders in the glaciated region, and are a source of water power.

Climate. In the southeastern section, which is protected by the mountain ridges and swept by ocean winds, the climate is mild and equable. In the interior mountain valleys the winters are cold, and the summers are intensely hot. The mountains, however, are delightfully cool in the summer, and in them are many summer homes and hotels. The annual temperature decreases toward the northwest, but in the Erie plain the moderating influence of the lakes is felt. At Philadelphia the winter temperature averages 34°, and the mean summer temperature is 74°.

The annual rainfall averages forty-four inches. Rains are plentiful in all parts of the state, ranging from fifty inches in the southeast to forty inches in the northeast and southwest sections. Northwest of the Blue Mountains there are heavy snows, which sometimes cover the ground the entire winter and flood the streams in the spring.

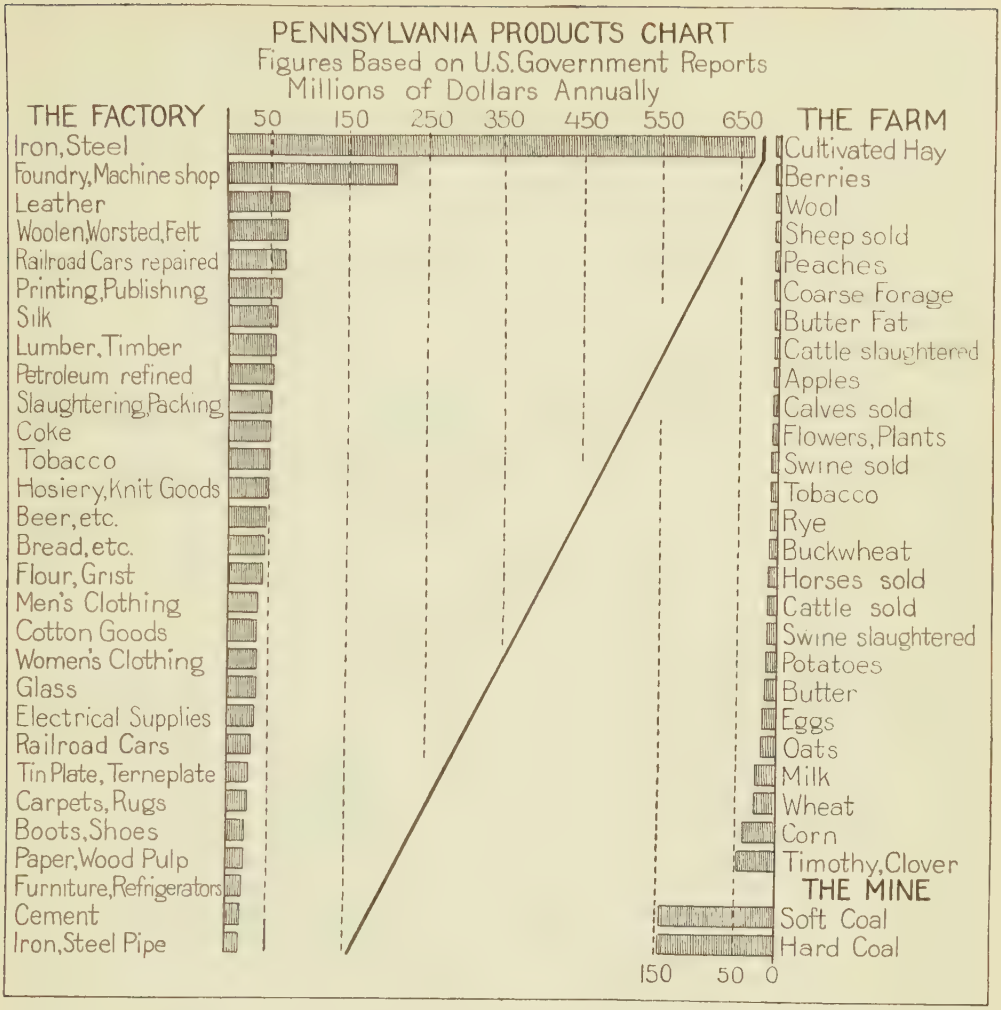
Sources of Pennsylvania's Wealth

Agriculture. Pennsylvania is generally more fertile than the other North Atlantic states, and in its rich valleys are some of the most prosperous farms in the East. Over one-half of the area of the state is in farms, and more than two-thirds of the farmlands are improved. Cereals and hay are the most valuable crops. The annual output of the latter is worth over $67,000,000, an amount which is exceeded only by New York. The rolling fields of the southeastern part of the state are particularly well adapted to the growing of cereals, the value of which constitutes about forty per cent of the total income from crops. Of these, corn is most important, the value of the annual production exceeding $40,000,000. Wheat, oats and rye are also harvested in large quantities, and in the raising of buckwheat Pennsylvania leads all of the states except New York. There are about 280,000 acres devoted to this last crop, and the annual production is over 5,000,000 bushels.

Pennsylvania raises more potatoes than any of the other Eastern states except Maine and New York, and in the growing of vegetables for the market, which is important especially near Philadelphia and Pittsburgh, the state is outranked only by New York and Ohio. Small fruits are also extensively cultivated near the large cities. The largest orchards are in the mild southeastern section; apples, peaches and pears are the principal fruits, though cherries, plums, prunes and apricots are also grown. Most of the grapes are cultivated in the Lake Erie region. In 1910 Pennsylvania ranked thirteenth among the states in the Union and second among the Eastern states in the total value of crops. A state commission of agriculture was created in 1915, and experiment stations had previously been established.

Pennsylvania leads all of the Eastern states in the value of poultry, and in the income from dairy products the Keystone State ranks third among the states in the Union. In 1910, Pennsylvania led all of the states in the value of the cheese and butter product, although the amount produced was exceeded in Wisconsin, Iowa and Minnesota. Including horses, milch cows and other cattle, swine, mules and sheep, the value of the live stock in the state exceeds $180,000,000.

Forests. When first settled, Pennsylvania was covered with primeval forests of white pine, hemlock and other timber, but the axe of the lumberman has sadly changed the great timberlands of "Penn's Woods." About one-half of the area of the state is forested land, but the virgin growth and the greater part of the merchantable timber have been cut. Many of the mountain slopes are covered with white and yellow pines and hemlocks, and in the valleys are forests of hickory, elm, maple, beech, walnut and chestnut and groves of cedar, holly, tulip and magnolia trees.



The most important soft woods, commercially, are hemlock and white pine, and of the hard woods the oak and maple. From the latter a considerable quantity of maple sugar and syrup is produced.

The state is doing much toward the reforestation and protection of timberlands; there are three state nurseries and over 900,000 acres in forest reserves. A state commissioner and a department of forestry have been appointed, and Pennsylvania has the only state forest academy in the country. Seedlings are distributed at cost for the growing of private woodlands, and municipal forests may be established with the consent of the commissioner in any city, borough or town of the first-class. The city of Williamsport owes its great development to its lumber and timber industry, but in recent years there has been a marked decline in this activity.

Minerals. Pennsylvania is the leading mineral state in the Union. The output of its mines, excluding the derived products, is about one-fourth of the entire output for the United States, and exceeds the combined production of West Virginia, Ohio, Illinois and California, the four states ranking next in the value of minerals. The state's most important mineral product is coal, and in the production of both anthracite and bituminous Pennsylvania far exceeds all of the other states.

Anthracite coal was discovered in 1768 in the Wyoming Valley in Pennsylvania. It was at first considered too hard to burn and therefore worthless, and not until the early part of the next century were its use and value learned.

The mining of anthracite increased from one ton a day in 1820 to about 140,000 tons a day in 1900, and the present output ranges from 80,000,000 to 90,000,000 long tons per year. The output of bituminous coal is steadily increasing, and the annual production is now between 150,000,000 and 200,000,000 short tons. The workable anthracite fields cover about 480 square miles; the estimated available supply exceeds 16,150,000,000 short tons, and there are 14,200 square miles of bituminous coal in which the supply still available is probably over 108,400,000,000 short tons. Many provisions have been made for the health and safety of miners.

Pennsylvania's output of coke, most of which comes from the great ovens at Connellsville, is more than the combined production of all other states in the Union.

Next in importance among the mineral industries is the production of cement and of clay products. The Lehigh district, including four counties in Pennsylvania and one in New Jersey, is the greatest cement-producing region in the world, and furnishes almost one-third of the cement used in the United States. Although the Keystone State leads in the production of fire brick, it is surpassed by Ohio in the total value of its clay products.

Two other great sources of fuel are petroleum and natural gas. In the production of the former West Virginia exceeds Pennsylvania in quantity, but when ranked according to the value of the amount produced and consumed the latter state leads. Petroleum of "Pennsylvania grade" has become famous and is the standard by which other crude oils are judged. It is free from sulphur and asphalt and contains a large amount of gasoline and paraffin. The state ranks fifth in value of petroleum produced, although it once ranked first.

Although Pennsylvania owes its preëminent position as a mineral state to its coal, it also ranks first in the value of marketed stone products; it is first in the yield of slate, producing three-fifths of the total output of the states; first in limestone, lime, sand and gravel. Other important minerals are iron, feldspar, glass sand, graphite, copper, metallic paints and mineral waters.

Manufactures. The abundance of fuel and raw materials, excellent means of transportation and the proximity of the markets to New York, Philadelphia and Pittsburgh have all combined to develop the stupendous manufacturing industries of Pennsylvania, which surpass those of any other state except New York.

As early as 1756 Pennsylvania was said to be the "most advanced of the American colonies in regard to its ironworks," and it has continued to be the country's greatest producer of iron and steel products. The annual output of pig iron, exceeding 12,000,000 tons, far surpasses that of any other state. The steel products of Pennsylvania and the skill of its engineers are famous in all parts of the world. The bridge over the Atbara River in the Soudan in Africa was made by the American Bridge Company of Philadelphia; the Hawkesbury River bridge in Australia is also made of Pennsylvania steel. The Baldwin locomotives and the Westinghouse air-brake are used by railroads in all parts of the world; in the construction of steel cars and locomotives Pennsylvania is without a rival among the states. Another important branch of steel construction is the building of ships; the yards bordering the Delaware in the vicinity of Philadelphia and Chester are the largest in the world, with the exception of the Clyde yards in Scotland.

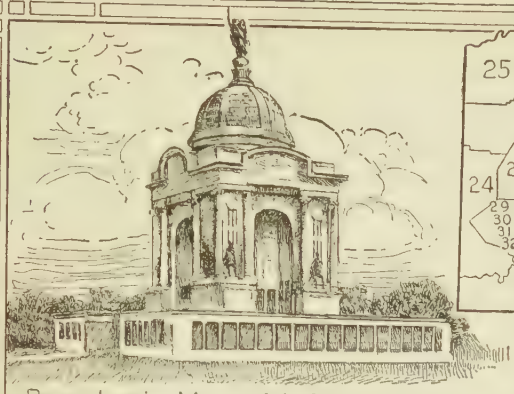
The manufacture of textiles follows the iron and steel industry in importance, and in this branch Pennsylvania ranks second among the states. It includes the production of woolens, worsted and felt goods, silks, knit goods, hosiery and cotton goods.

The tanning and finishing of leather is another of the principal industries and one in which this state outranks all others. Since there are about 115 manufactures in which Pennsylvania holds first, second or third place, only a few of them can be mentioned here. Besides the products given above, the state is one of the first three in the production of tinplate and plate glass, steel springs, surgical supplies, felt hats, sandpaper, bread and bakery products, carpets, women's clothing, electrical machinery and supplies, explosives, gold and silver leaf and foil, liquors, chemicals, chocolate and cocoa products, cooperage, cutlery, dyestuffs and extracts, glue, marble and stonework, roofing materials, pottery and terra cotta products. Petroleum, tobacco and sugar refining should also be included among the foremost manufacturing enterprises.

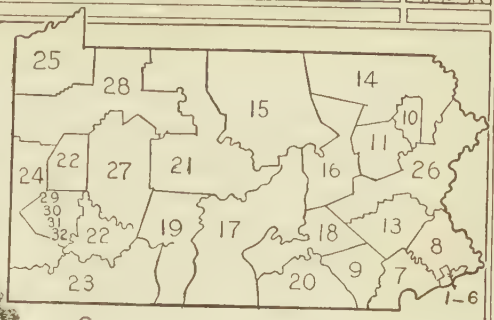
In the year 1920 there were 27,521 manufactories in the state, capitalized at over six and a quarter billion dollars. The value of the products in that year of abnormally high prices was $7,316,063,000. The manufacturing center is Philadelphia.

Transportation and Communication. The Delaware River on the east; the Delaware and

PENNSYLVANIA

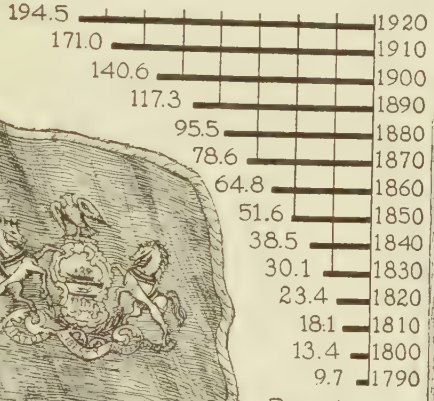


Pennsylvania Memorial, Gettysburg.

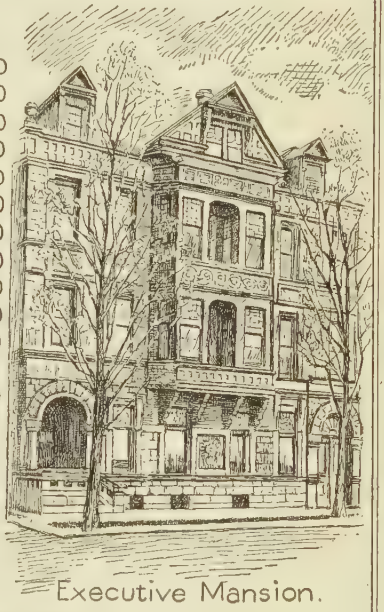


Congressional Districts.

State Flag.
State Seal on Blue Background.

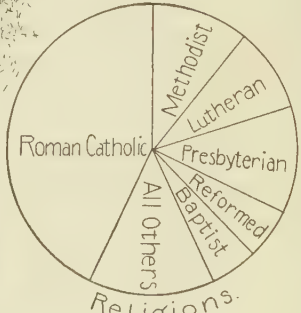


People Per Sq. Mile by Decades.



Executive Mansion.

State Library and Museum, Harrisburg.



Religions.

Raritan Canal, extending across New Jersey, and the Delaware and Chesapeake Canal furnish outlets to the sea. Many of the rivers of the state are made navigable by locks and are connected by canals, and the Ohio opens the river route by way of the Mississippi to the Gulf of Mexico. Lake Erie, on the northwest, gives Pennsylvania access to the commercial highway of the Great Lakes.

In 1829, at Honesdale, Pa., the first locomotive in America was operated, and now there are over 12,000 miles of railroad in the state, a mileage exceeded only in Texas and Illinois. The most important roads are the Pennsylvania; Philadelphia & Reading; Lehigh Valley; Baltimore & Ohio; New York Central; Erie; Buffalo, Rochester & Pittsburgh; and the Delaware, Lackawanna & Western. Philadelphia and Pittsburgh are the chief railroad centers. Railroads are controlled by a public utilities commission, created in 1913.

There are over 4,000 miles of electric railway in the state, and there is interurban connection between Philadelphia and New York City. About 4,000 miles of the public roads are surfaced.

Government and History

Government. The constitution of 1873, with a few amendments, is the present basic law of the state. Three other constitutions had been previously adopted—in 1776, 1790 and 1838. Amendments may originate in either house of the legislature and to become effective must be adopted by two successive assemblies and must receive the affirmative vote of the people. Every male citizen twenty-one years of age who has resided in the state one year and in the district two months and has been a United States citizen one month may vote. In 1915 an amendment providing for woman's suffrage was defeated by a large majority.

Legislative Department. The lawmaking body is the general assembly, consisting of a senate and a house of representatives. One senator is chosen from each of fifty senatorial districts, and one-half of the body is elected every two years. The representatives, 205 in number, are elected for terms of two years and are apportioned according to population. A two-thirds vote of all members in each house of the assembly is necessary to make appropriations of money to a charitable or public institution not under absolute control of the state. The legislature meets on the first Tuesday in January, in the odd-numbered years. There is no prescribed limit to the length of the sessions.

Executive Department. The power of administering the government is vested in a governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general and superintendent of public instruction. The salary of the governor is $10,000 per year. These officers are elected for four years.

Judiciary. The judicial department consists of a supreme court and a superior court, each having seven judges; courts of common pleas, of oyer and terminer (courts having higher criminal jurisdiction), general jail delivery courts, quarter sessions of the peace courts, orphans' courts and magistrates' courts. All judges are elected by the people, those of the supreme court for twenty-one years and all others for ten years. In 1913, electrocution was substituted for hanging in cases of capital punishment. Workmen's compensation acts and advanced child labor laws are in force.

Earliest Settlement. Although Henry Hudson sailed into Delaware Bay in 1609, laying the foundation for the Dutch claim to the bay and river, and Dutch trading posts were founded on the east side of the stream, the first settlement in what is now Pennsylvania was made by the Swedes. Some of the churches of these religious colonists are still standing in Philadelphia and their presence is also recorded in the names of many towns near Philadelphia and Chester, such as Swedeland and Swedesburg. The Swedish, and later the Dutch, authority was ended by the British, who secured the Pennsylvania territory with New York in 1664.

Creation of Pennsylvania. In payment for a debt owed to Admiral Penn, Charles II bestowed a grant of the territory west of the Delaware between 40° and 45° upon the former's son, William Penn, the Quaker. Although Penn was granted absolute feudal rights, his liberal government, religious toleration and the social freedom of the colony attracted many from all countries, and Pennsylvania became the largest and most successful of the proprietary colonies.

Boundary disputes arose with New York, Connecticut, Maryland and Virginia, which were not settled for many years. The southern limit of the colony was fixed by the drawing of the famous Mason & Dixon Line in

RESEARCH QUESTIONS ON PENNSYLVANIA

(An Outline suitable for Pennsylvania will be found with the article "State.")

Name the most noted battle fields of the state and describe briefly the engagements which took place on them.

Give two popular names for this state, and account for both.

What does the official name tell you of the character of the state when it was first settled?

How many of the thirteen original colonies were founded before Pennsylvania?

How many states of the American Union are larger than Pennsylvania? How many of these larger states have a larger population? (See list, in article UNITED STATES.)

How long a lake boundary line has this state? To what does it owe its possession of this shore line?

If the entire United States had as many people to the square mile as has Pennsylvania, what would the population of the country be?

What states have a density of population greater than that of Pennsylvania? (See list, in article UNITED STATES.)

How does it rank among the Northern states with regard to its negro population?

What mineral substance does this state furnish that makes work easier and pleasanter in the schoolroom, especially in the lower grades?

What percentage of the population are of foreign birth or of foreign parentage?

How many of the fifty largest cities in the country are in this state? (See list in article CITY.) How many of the ten largest cities are in Pennsylvania?

Why did many parents hesitate for a long time to send their children to the free public schools? When was this condition of affairs done away with?

What and where is the Delaware Water Gap? For what is it famous?

What traces of its presence did the great ice sheet of the Glacial Age leave in this state?

How does the region which was formerly covered with glacial ice differ from the region to the south of it?

How do location and altitude modify the climate in different parts of the state?

How large a proportion of the entire area of the state is in improved farms?

What article of food that frequently appears on the breakfast table is grown more plentifully in Pennsylvania than in any other state?

How does the state rank as a mineral producer?

Why was not the discovery of anthracite considered at first as of any importance?

About how many tons are now mined each day? How does this compare with the amount mined a century ago?

How many states surpass Pennsylvania in total value of manufactured articles?

Make a list of all products, whether agricultural, mineral or industrial, in which this state ranks first; of those in which it ranks second.

What is the railroad mileage to each hundred square miles of area? How many states surpass it in this respect?

If the entire country had the same railway mileage in respect to area as has Pennsylvania, how long would the railways of the country be?

How did the early history of this state prove that the Indians were capable of keeping faith with any white men who kept faith with them? See PENN, WILLIAM.

1763-1767, and the arc between Delaware and Pennsylvania. The northern limit was not settled until 1789, when the forty-second parallel was made the boundary between this state and New York. The triangular section on Lake Erie was purchased in 1792.

After Penn's death petty disturbances in the colony became grave, and the Indians who had formerly been the friends of the colonists attacked the frontier settlements. The French and Indian War and the claims of both Connecticut and Pennsylvania to the Wyoming Valley led to Indian uprisings which resulted in the terrible Wyoming Massacre.

The Age of Franklin. The outstanding figure in the history of Pennsylvania during the Revolutionary period was Benjamin Franklin, the colony's agent in England. He vigorously opposed the Stamp Act and represented Pennsylvania in the Provincial and Continental congresses.

The first two Continental congresses met in Philadelphia except during those months when the city was occupied by the British, when sessions were held at Lancaster and York, both Pennsylvania towns. It was at Philadelphia, in Independence Hall, that the Declaration of Independence was adopted. The state was the scene of the battles of Brandywine, Paoli, Fort Mifflin and Germantown; Washington's headquarters at Valley Forge during one terrible and memorable winter may still be seen, near the Susquehanna, twenty-four miles north of Philadelphia.

In 1781 Pennsylvania adopted the Federal Constitution. The state played a prominent part in the early history of the United States; it was Robert Morris of this state who was the "banker" of the Union until a banking system was established by Alexander Hamilton.

Later History and Development. In the crisis of 1861, the position of Pennsylvania as a central state was of vast importance to the Union, and it was then that Whittier addressed his call, *To Pennsylvania:*

O State prayer-founded! never hung
Such choice upon a people's tongue,
Such power to bless or ban,
As that which makes thy whisper Fate,
For which on thee the centuries wait,
And destinies of man!

And unto thee in Freedom's hour
Of sorest need God gives the power
To ruin or to save;
To wound or heal, to blight or bless
With fertile field or wilderness,
A free home or a grave!

At the first sound of war Pennsylvania fulfilled the hopes of the North and responded with nearly twice its quota of troops, and besides 336,000 soldiers it furnished Generals McClellan, Hancock and Reynolds and Admirals Porter and Dahlgren. Being close to the field of battle, the state suffered from many raids. On July 1-3, 1863, the greatest battle of the war was fought at Gettysburg, in Adams County, and a year later Chambersburg was raided and burned.

Since the war industrial development and prosperity have been remarkable, though frequently interrupted by serious strikes; that at the steel mills at Homestead, near Pittsburgh, in 1892 was one of the gravest industrial disturbances in American history. A serious general strike of the anthracite miners occurred in 1902. The state also suffered from two disastrous floods, one at Johnstown in 1889 and the second at Austin in 1911.

In 1921 a Department of Public Welfare was created; November 11 was made a legal holiday.

Other Items of Interest. Pennsylvania furnishes over 6,000,000 school slates and more than 3,000,000 square feet of blackboard material each year.

When Penn made his treaty with the Indians under the Shackamaxon elm, wampum belts were exchanged, according to custom, by the parties to the treaty. The one said to have been given to Penn by the Indians is in the possession of the Pennsylvania Historical Society. Woven into its strings of white and black beads are figures representing an Indian and a European, with hands joined in friendship.

It is said that Penn offered about $100 to the secretary of Charles II if he would drop the prefix *Penn* from the name of the territory, but no one can fail to be glad that the offer was not accepted.

If the northern boundary of Pennsylvania ran straight west, the state would be without a port on Lake Erie. The early settlers realized the importance of such an outlet, and purchased from the United States government for about $150,000 the triangle of land in the northwest corner of the state, on which has grown up the thriving industrial city of Erie.

Over one-fourth of the manufactured articles of the state are made in Philadelphia. E.B.P.

Consult Walton and Brumbaugh's *Stories of Pennsylvania;* Sharpless' *Two Centuries of Pennsylvania History;* Pennypacker's *Pennsyl-*

vania in American History; Fisher's *Making of Pennsylvania.*

Related Subjects. The following articles contain much additional information as to Pennsylvania:

CITIES

Allentown
Altoona
Beaver Falls
Bethlehem
Braddock
Bradford
Bristol
Butler
Carbondale
Carlisle
Carnegie
Chambersburg
Charleroi
Chester
Coatesville
Columbia
Connellsville
Dickson City
Du Bois
Dunmore
Duquesne
Easton
Edwardsville
Erie
Farrell
Franklin
Greensburg
Harrisburg
Hazleton
Homestead
Johnstown
Lancaster
Lansford
Larksville
Latrobe
Lebanon
Lewistown
Lock Haven
McKeesport
McKees Rocks
Mahanoy City
Meadville
Monessen
Mount Carmel
Nanticoke
New Castle
Norristown
North Braddock
Oil City
Old Forge
Olyphant
Philadelphia
Phoenixville
Pittsburgh
Pittston
Plymouth
Pottstown
Pottsville
Punxsutawney
Reading
Scranton
Shamokin
Sharon
Shenandoah
South Bethlehem
Steelton
Sunbury
Tamaqua
Taylor
Uniontown
Warren
Washington
West Chester
Wilkes-Barre
Wilkinsburg
Williamsport
York

HISTORY

Brandywine, Battle of the
Franklin, Benjamin
Germantown, Battle of
Gettysburg, Battle of
Mason and Dixon's Line
Penn, William
Valley Forge
Wyoming Valley Massacre

LEADING PRODUCTS

Buckwheat
Butter
Cement
Cheese
Coal
Coke
Corn
Hay
Iron
Leather
Petroleum
Potato
Poultry
Steel

PHYSICAL FEATURES

Appalachian Mountains
Blue Ridge
Delaware Water Gap

RIVERS

Allegheny
Delaware
Lehigh
Monongahela
Ohio
Schuylkill
Susquehanna

PENNSYLVANIA, UNIVERSITY OF, one of the largest and most influential universities in the United States, the outgrowth of a charitable school founded in 1740 in Philadelphia. Through the activity of Benjamin Franklin and the efforts of a group of other public-spirited citizens, this school was made an academy in 1751. Two years later it received a charter from the son and the grandson of William Penn, and in 1755 was rechartered as the College and Academy of Philadelphia. In 1791 the present institution, which represents a merger of the old college and a university provided by act of legislature in 1779, was incorporated under the title University of Pennsylvania. The campus, since 1872, has been on a site near the west bank of the Schuylkill.

THE UNIVERSITY IN 1765

The university is organized into the following departments: the College; the School of Arts (arts and science, biology and music); the Wharton School of finance and commerce; the Towne Scientific School, in which are offered courses in architecture, mechanical, chemical, electrical and civil engineering, science and technology; a school of education; the departments of philosophy, or the graduate school; the departments of law, medicine, dentistry and veterinary medicine; the University Hospital; the Wistar Institute of Anatomy and Biology; the Laboratory of Hygiene; the Veterinary Hospital; the Henry Phipps Institute (for the study and treatment of tuberculosis); the Psychological Clinic, the Library and the Flower Astronomical Observatory; the department of physical education; and the University Museum.

The government of the institution is vested in a board of twenty-four trustees, of which the president *ex officio* is the governor of the state; the university chief executive is called the

provost. A generous system of scholarships is maintained, a large number being awarded to graduates of the Philadelphia public schools. Women are admitted to courses in the graduate department. The library contains about 450,000 volumes, and there are about 975 instructors and nearly 11,500 students.

PENNY, *pen'i,* a small bronze English coin which is equivalent to four farthings, one-twelfth of a shilling and one two-hundred-fortieth of a pound sterling. In United States money, a pound sterling is equal to $4.86+, and an English penny to about two cents (see *Table of Equivalent Values* under the heading DENOMINATE NUMBERS). Up to the time of Edward I, the English penny was so deeply indented with a cross that it could be easily broken into two or four equal parts, thus giving halfpennies and farthings (four things). At present the coin weighs 145.833 Troy grains and intrinsically is worth one-fourth its face value. Its abbrevation is *d,* from its similarity to the Roman coin *denarius* (which see). A German silver coin has a similar name, *pfennig,* and the United States one-cent piece is commonly called a penny. The plural of *penny,* when the value of the coins is considered, is *pence.* See CENT.

PENNYROYAL, *pen i roi'al,* a name applied in America to a medicinal herb of the mint family, the leaves of which have a strongly-pungent odor. The oil yielded by the plant is used in medicine for its stimulating properties. Preparations containing oil of pennyroyal are used to drive away mosquitoes, as its odor is intensely disagreeable to them. The North American pennyroyal grows in fields and woodlands from Cape Breton Island to Florida, and west as far as Nebraska. Its stem, which is branched and hairy, grows from six inches to a foot and a half in height and bears small, purple flowers that bloom from July to September. This plant, also called *tickweed* and *squaw mint,* is similar in properties to the European species, which is the true pennyroyal.

PENOBSCOT, *pe nob'skot,* the largest river in the state of Maine. It rises in a small lake near the Canadian border, and after flowing eastward through pine forests, where it widens to form Chesuncook and Pamedumcook lakes, it is joined by the Seboosis River and flows southward into Penobscot Bay, an inlet of the Atlantic. Although about 350 miles in length, it is navigable for ocean steamers only to Bangor, sixty miles from the sea. However, smaller boats ascend the stream much farther into a vast lumbering region. In the spring the river furnishes transportation for the logs which are floated for miles down to the sawmills. In the winter season ice is harvested in large quantities.

PENSACOLA, *pen sa koh'la,* FLA., a port of entry on Pensacola Bay, and the county seat of Escambia County, is the third largest city in the state, ranking next to Jacksonville and Tampa. Its population in 1910 was 22,982; in 1920 it was 31,035 (35 per cent gain). It is in the extreme western part of the state, six miles north of the Gulf of Mexico, forty-eight miles southeast of Mobile and 204 miles west of Tallahassee, and on the Gulf, Florida & Alabama, the Louisville & Nashville and the Pensacola, Alabama & Tennessee railroads. Pensacola Bay affords a large, deep, landlocked harbor, and its entrance is protected by forts Pickens, Barrancas and McRee. A government navy yard here is the winter station of submarine and torpedo boats. Several steamship lines make regular sailings to American and transatlantic ports.

Interesting features of the city are the Federal building, courthouse, state armory, city hall, the United States Naval Hospital, Pensacola Hospital and the laboratory of the State Board of Health. Seven miles distant is the United States Naval Aeronautic School. In the vicinity are the historic remains of the old Spanish Fort San Carlos, built in 1696, and of the English Fort George. The commerce of the port is important. The annual value of exports is approximately $20,000,000, that of imports $2,000,000. The leading articles of trade are lumber and fish, and among others are included naval stores, cotton, phosphate, coal and grain.

Pensacola was permanently settled in 1696 by a Spanish colony from Vera Cruz. It has been a possession of Spain (1696), France (1719), Spain (1723), England (1763) and Spain (1781), successively. Because of aid rendered to the British in the War of 1812, it was captured by General Jackson in 1814, and in 1818 was retaken by him from the Spaniards, who were encouraging hostilities on the part of the Seminole Indians. By treaty the entire state passed into possession of the United States in 1819. In 1864 a great fire partially destroyed Pensacola. In 1913 the city adopted the commission plan of government.

PENSION, *pen'shun,* a stated sum of money paid to a person at periodical intervals. As commonly understood, however, a pension is a stated allowance granted by a government to citizens or subjects on account of services ren-

dered in the army or navy. It is a theory of government that those who offer their lives for the protection of the nation should be cared for at the expense of all the people if during their sacrificing service they suffer permanent loss of health or bodily injury from which there is no recovery. In case of death while in service those left dependent are entitled to help, as a matter of simple justice.

United States. *Revolutionary Period.* The first *disability pensions* (granted to disabled soldiers) followed the Revolutionary War; the first general pension bill was passed in 1792. Various acts of Congress enlarged the terms of the pension law, allowing a larger number of claimants, as they became aged, to receive benefits. In 1818 appeared the first *service pension* for the survivors of that war. It was provided that all who had served to the end of the war, or for a period of nine months during any part of the conflict, should receive a pension, if found in needy circumstances. In 1832 it was enacted that all who had served two years in that war should receive full-pay pension for life, and proportional pensions were provided for all who had served less than two years but for more than six months. In 1836 pensions were granted to widows of Revolutionary War soldiers, but for only a period of five years, and conditioned on the fact that the marriage was prior to the last service and that said service was for a period of at least six months. In 1853, all limitations as to time of marriage were swept away. Esther S. Damon, the last widow entitled to a pension under this provision of the law, died at Plymouth Union, Vt., in 1906, one hundred twenty-three years after the close of the Revolutionary War. The total amount in pensions paid by the United States on account of the War of the Revolution was about $70,000,000.

Between the Revolution and War of Secession. The pension regulations for the War of 1812, the Indian wars, and the war with Mexico, 1846-1848, passed through similar historic stages. Service pensions were granted in 1871 on account of the War of 1812, and enlarged in 1878. The pension rolls for 1916 contained the names of 115 soldiers' widows of the War of 1812; the United States has disbursed as pensions on account of that war nearly $46,000,000. Service pensions have been granted on account of the various Indian wars.

The final stage of pensions on account of the Mexican War of 1846 was reached in 1881, but the provisions were rendered more liberal by successive enactments, the last being that of 1912, which provided that all soldiers and sailors who served sixty days in that war and were honorably discharged should receive $30 per month. In 1921 the pension rolls contained the names of 109 survivors and soldiers' widows of that war, and the United States has paid out in pensions on account of it about $48,000,000.

War of Secession. The pension disbursements of the United States on account of the War of Secession, 1861-1865, have been on a scale hitherto unknown in history. The first general disability pension law on account of that war was enacted in 1862. Its provisions were enlarged, becoming more and more liberal, until in 1890 the first service pension law was passed. It was, however, of a restricted nature; it provided that all who had served ninety days in the war and were suffering any disability of a permanent character which incapacitated them from manual labor should be entitled to a pension, varying in amount from $6 to $12 per month. The provisions of this act were rendered more liberal by various laws until in 1912 it was enacted that all War of Secession survivors, whether disabled or not, who had served ninety days, should receive pensions, varying with the age of the survivor. The United States has paid out on account of that war, up to 1917, $4,765,075,020.

In 1919 the total number of names on the pension rolls of the United States was 556,053, of whom over one-half were widows or dependents. This number includes 31,066 pensioners of the Spanish-American War.

Rates of Pensions. The amounts paid per month for total disability, incident to actual service, range from $30 to $8. The former amount is paid to lieutenant-colonels in the army and captains in the navy, and to all those of higher rank; lower officers receive $25, $20, $15 and $10, while enlisted men receive $8.

War of the Nations. When the United States entered the war against Germany in 1917 a substitute for a pension system was adopted in behalf of soldiers who should be engaged in Europe. The government insured the soldier to a maximum of $10,000, at a yearly cost of $7.56 to $8.40 per $1,000; only father, mother, brother, sister or wife could be a beneficiary.

The Bureau of Pensions. The mass of detail necessarily connected with the pension business is cared for in a special Bureau of Pensions, established in connection with the Department of the Interior. This bureau requires the services of about 2,000 clerks. Pension bills are

paid every three months through the disbursing department of the Bureau. The magnitude of the business is realized when it is noted that the disbursements on account of pensions in 1916 was over $159,000,000, and that to date the United States has paid out since its national life began the enormous sum of over $4,800,000,000.

In Canada. The Dominion of Canada does not maintain a regular standing army, but the government has been obliged to call military forces into the field on occasion of insurrections and rebellions, notably the Riel Rebellion. Since the organization of the Dominion in 1867 Canada has distributed in pensions nearly $5,000,000; the annual appropriation before the late war was a little in excess of $200,000 per year. The new pension regulations are outlined on page 1132, Volume Two.

Pension Systems of Europe. Pensions as understood in European countries have more to do with the civil service; they are grants made to those who have served the state for a period of years; they are also bestowed as rewards for exceptional services, to scholars who have made important discoveries or distinguished themselves in literary pursuits. In England there is a small service pension for its soldiers and sailors, depending on length of service, which must cover several years' time, and the nature of the disability.

For other forms of pensions other than military or naval, see MOTHERS' PENSIONS, OLD AGE PENSIONS. Consult *Reports of the Commissioner of Pensions* (issued annually; Washington, D. C., Pension Bureau).

PENTATEUCH, *pen'ta tuke,* meaning *five books,* refers specifically to the first five books of the Old Testament, including *Genesis, Exodus, Leviticus, Numbers* and *Deuteronomy,* believed to have been originally one work. Scholars now include a sixth book, *Joshua,* and call the whole the *Hexateuch.* These old Scriptures were compiled from three different sets of documents. The first, known as the *Covenant Code,* included the primitive Hebrew narratives and laws; the second, known as the *Deuteronomic Code,* a restatement of the law as it is first found in *Exodus;* and the third, known as the *Priestly Code,* or *Law of Holiness,* found in *Leviticus* and *Numbers.*

Consult Green's *The Higher Criticism of the Pentateuch.*

PENTECOST, *pen'ta kawst,* or **FEAST OF WEEKS,** a Jewish festival celebrated as a token of thanksgiving for the ingathering of the grain harvest. It was observed on the fiftieth day after the Passover, or Feast of Unleavened Bread, which marked the opening of the harvest. The name Feast of Weeks refers to its occurrence seven weeks after the second day of the Passover. An offering of leavened loaves was made for the community, and individuals brought offerings according to the abundance of their harvest (*Deuteronomy* XVI, 10). Gifts were also made to the Levites and the poor. In later Jewish history, Pentecost became one of the pilgrimage feasts, at which all Jewish men were required to present themselves in Jerusalem.

The Christian Pentecost, held fifty days after Easter, celebrates the descent of the Holy Spirit (*Acts* II, 1-4). The name Whitsunday, often given it, refers to the white garments worn on that day by candidates for baptism.

PENTICTON, *pen'tik tun,* a town in the southern part of British Columbia, in the heart of the Okanagan district. It lies between two lakes, the famous Okanagan, seventy miles long, on the north, and the less-known Skaha, ten miles long, on the south. These two bodies of water, though not very deep, act as a thermostat, which tempers the climate and makes the air warm in winter and cool in summer. Penticton's equable climate and the fertile soil of the near-by valleys and bench lands are adapted to the cultivation of apples, peaches, grapes, tomatoes and other fruits and vegetables, for which the town is famous. The irrigation system, which is essential to the success of agriculture in this dry belt, is owned by the municipality. The packing and canning of fruit is naturally the chief industry, but lumbering is an important second. Population in 1911, 1,100; in 1921, about 2,500.

Penticton has long had steamship connection with the northern end of Okanagan Lake, where a branch of the Canadian Pacific Railway provided an entrance into the valley. Only since 1915, when the Kettle Valley Railway was completed, has Penticton had direct railway connection. It is now 251 miles east of Vancouver by the direct rail route, whereas by the old rail-and-water route it is 450 miles. Nelson is 261 miles east on this new line, which is sometimes called the Canadian Pacific's southern main line. All freight from Nelson and the Kootenay country is now shipped to the Pacific coast via Penticton. Being a divisional point, the town has railway yards and shops. It was founded about 1890, and was organized as a township or municipality in 1908. B.C.B.

PENUMBRA, *pe num' bra,* a partial shadow cast during an eclipse The word means *almost in shade.* In the accompanying figure, the more lightly-shaded portions show the *penumbra.* From the darker, cone-shaped figure, rays

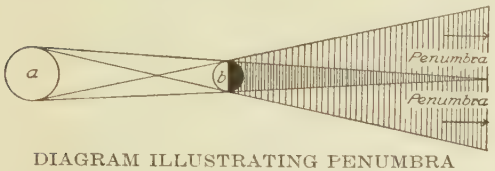


DIAGRAM ILLUSTRATING PENUMBRA

(*a*) represents the luminous body, the sun; (*b*) represents the illuminated half of a sphere, which receives light from the luminary. The heavy-shaded lines behind *b* represent the *umbra,* where practically total darkness prevails. The light-shaded lines represent the *penumbra,* which is in partial shadow.

from the sun (*a*) are cut off by the intruding body (*b*), and a total shadow called the *umbra* results. If the observer is within the penumbra, he sees a partial eclipse. If he is near the dark cone, the obscuring body will almost cover the sun's disk; but if he is stationed near the outer edge of the penumbra, the object will appear to encroach but little on the source of light. In a total eclipse, the observer is within the umbra, and all light is excluded. See ECLIPSE.

PEONAGE *pe' on ayj,* a system of enforced labor formerly existing in the Spanish colonies in America, particularly in Mexico. The term is derived from the Spanish *peon,* signifying *day laborer,* and originally referred especially to Indians. As the Spanish government exempted Indians from military service and the payment of taxes and tithes, they were excluded from certain political and social privileges and were at the mercy of the Spanish governors.

There were two kinds of peons. The smaller class consisted of those Indians who were paid agricultural laborers, and free to make their own contracts. The second and much larger class contained the criminal laborers who for debt or petty offenses were condemned to practical slavery. Under corrupt officials, this last class was extended to include most of the Indians. Legally the system was abolished long ago, but the name *peon* is still used to refer to laborers of Indian or mixed blood who through ignorance are still the victims of similar abuses.

Peonage in the United States. This Mexican custom at one time existed in the United States territory comprising the present states of New Mexico and Arizona, but was abolished by a national law in 1867. The term, even since the beginning of the twentieth century, was also applied to alleged abuses in the convict labor system, especially among negro prisoners. Investigations revealed that negroes were arrested on false and vague charges and were fined. If unable to pay the fine, as was usually the case, they were given to the highest bidder to work without wages for a certain period of time; at the end of this period they might be rearrested and again forced into service. In 1911 the United States Supreme Court declared all laws permitting this practice to be unconstitutional.

PEONY, *pe' o ni,* a group of plants with shrubby or herblike stems, valued by gardeners because of their large, handsome flowers. The peonies belong to the buttercup family. Many of the cultivated varieties common in America are the offspring of two species of the eastern hemisphere—the *common peony* of Southern Europe and the *white peony* of Siberia. The large, solitary flowers of the common peony are red or crimson, and very striking in appearance, though lacking in fragrance. Many of the *Chinese peonies,* a large group of hybrids, bear double-flowered, sweet-scented blossoms. Large species of the peony group are called tree peonies, and of this division the best known is a native of Japan and California. Its showy blossoms, presenting a wide range of white and rose-colored hues, are borne on a stalk from three to four feet high. Tree peonies usually need considerable care and are typical greenhouse plants.

A helpful book on peony culture is C. S. Harrison's *Manual for the Propagation and Cultivation of the Peony.*

PEOPLE'S PARTY, in the United States, the official name of the political organization better known as the *Populist* party. A member of the People's Party was called a Populist, and in the course of time the party itself was commonly called by that name. See POPULIST PARTY.

PEORIA, *pe o' ri a,* ILL., the county seat of Peoria County, and for a good many years the largest city in the state, excepting Chicago, is located fifty miles north of Springfield and 150 miles southwest of Chicago. It is on the Illinois River, here expanded into Peoria Lake, which affords navigation to its mouth and to La Salle, above Peoria, where connection is made with the Illinois & Michigan Canal, extending to Chicago. The railroads entering the city are the Chicago, Burlington & Quincy, the

Chicago & North Western, the Chicago & Alton, the Chicago, Peoria & Saint Louis, the Chicago, Rock Island & Pacific, the Cleveland, Cincinnati, Chicago & Saint Louis, the Illinois Central, the Lake Erie & Western, the Minneapolis & Saint Louis, the Peoria & Pekin Union, the Toledo, Peoria & Western and the Vandalia lines. An electric interurban line runs to Bloomington and Springfield. In 1910 the population was 66,950; in 1920 it was 76,121, a gain of 14 per cent.

Peoria occupies over nine square miles. The business and manufacturing sections are on the plain along the river; the residential sections extend into the surrounding low hills. Glen Oak, Bradley, Proctor Recreation Center and other parks together contain more than 400 acres. Grand View Drive, a boulevard 100 feet wide, overlooks the Illinois River Valley. Peoria is the seat of Bradley Polytechnic Institute and of Spalding Institute. It has the Peoria Public Library and a Carnegie Library, a law library, a Federal building, county courthouse (centrally located in the city and surrounded by a park where was held one of the famous Lincoln-Douglas debates), the Proctor Old Folks' Home, Proctor Hospital, the Crèvecoeur Club and other clubs, and several memorials to soldiers and sailors who lost their lives in the War of Secession.

Industry. Peoria is situated in the heart of the greatest corn-producing state in the Union, and is one of the important corn markets of the country, in 1915 handling more than 20,450,000 bushels. It is one of the largest distilling centers in the United States. Capital amounting to more than $8,000,000 is employed in the manufacture of distilled and malt liquors, and the value of the annual output averages approximately $46,000,000. The internal revenue collected in the Peoria district each year exceeds $28,000,000. Other important manufactures are agricultural implements, tractors, vehicles of all kinds, wire and steel products, paper, stoves and grain products. The annual value of the products of all industries is over $63,000,000. Peoria has also important interests in live stock and coal, and has an extensive commerce both by rail and water.

History. The site of the present city was once occupied by a village of the Peoria Indians. In 1680 La Salle built on the site Fort Crèvecoeur, which was abandoned within a year. French fur traders, who settled there some time in the eighteenth century, were driven out by General Craig in 1812 because of their suspected treachery in connection with Indian troubles. A permanent settlement was made in 1819, which was incorporated as a town in 1835 and as a city in 1845. Among Peoria's distinguished citizens have been Robert G. Ingersoll, George Fitch and Archbishop Spalding, and the city is the birthplace of Emma Abbott, one of the earliest American prima donnas.

Consult Rice's *Peoria, City and County.*

PEP'IN, or **PIP'PIN,** the name of several officers prominent in the early history of France who bore the title of *mayor of the palace* but had in reality the authority of kings. PEPIN THE ELDER, who died in 639, virtually ruled the kingdom during the reign of the weak Merovingian king Dagobert I. His grandson, PEPIN OF HERISTAL (died 714), was appointed mayor of the palace over the eastern part of the kingdom only, but finally succeeded in gaining control of the whole country. A natural son of Pepin of Heristal was the famous Charles Martel (which see).

Pepin the Short (714-768), like his predecessors, began his career as mayor of the palace. The people had come to recognize the utter feebleness of the Merovingian kings, and in 751 Pepin was able to depose King Childerich and have himself crowned king. He was the first of the Carolingian dynasty (see CAROLINGIANS). In two invasions of Italy he overthrew the Lombards, and by giving to the Pope the lands which he took from them he laid the foundation for that temporal sovereignty of the Papacy which had such varied consequences in European history.

PEPPER, *pep'er,* the general name for a number of spices of great commercial value. The familiar black pepper known in every household is the product of a trailing or climbing shrub cultivated in the East Indies and other tropical regions. The plant bears a small green berry about the size of a pea, which turns red on ripening. The berries are gathered just when they begin to change color, and are then cleaned and dried, the latter process taking place in the sun or before a slow fire. In drying, the berries turn black, and when ground and sifted they form the black pepper of commerce. White pepper is obtained from the ripe berries of the same plant. These are bruised, then washed until freed from the pulpy matter and bits of stalk, and finally dried. White pepper, though it has a finer flavor than black, is not so pungent. Red pepper is obtained from species of capsicum (which see), and the

so-called Jamaica pepper (see ALLSPICE) from the pimento tree.

The sharp, biting taste of ordinary pepper is due chiefly to an acrid resin and an acrid oil. Though used principally for seasoning purposes, this spice has medicinal value, and is sometimes taken as a remedy for flatulence, or gas on the stomach.

PEPPERMINT, *pep'er mint,* a perennial herb of the mint family cultivated extensively for a pungent oil produced in glands of the leaves. This oil, the widely-used peppermint of commerce, is valuable medicinally and as a flavoring. As alleviations for colic and toothache, peppermint preparations are well known. The oil is probably the most popular of all flavorings used in candy making, a recent estimate showing that sixty times as much peppermint is used as wintergreen, and four times as much peppermint as spearmint. Peppermint oil is obtained by means of pressure and distillation. In America, Saint Joseph County, Michigan, is the great center of the peppermint industry; the state produces about one-half of the world's supply of oil.

The plant grows from one to two feet high and bears smooth, sharp-pointed oval leaves and small bluish-white flowers. It is cultivated in England and in various sections of continental Europe; in the United States the peppermint sections outside of Michigan are in New York and Northern Indiana. See illustration, in full-page picture, on page 3785.

PEP'SIN, a ferment found in the gastric juice, which has the property of converting proteids (tissue-building foods) into peptones. In chemical composition it is not greatly unlike the ferment of saliva, *ptyalin,* but its effects are entirely different. It acts in the presence of a weak acid, whereas ptyalin responds better to a slightly alkaline medium. Pepsin has no effect upon fats or carbohydrates. It is produced commercially by drying the mucous lining of the stomachs of pigs and calves, and is then used to aid digestion by those having weak stomachs. The pepsin procured from the stomach of the pig is preferred. There are several commercial preparations of pepsin on the market.

Related Subjects. The reader is referred to the following articles in these volumes:

Food, subhead	Peptones
Chemistry of Foods	Proteids
Pancreatin	Stomach

PEPTONES, *pep'tohnz.* In the process of digestion proteid foods (such as lean meat, white of egg, peas and beans) are acted upon by the ferment *pepsin* of the gastric juice, and the ferment *trypsin* of the pancreatic juice. These ferments change proteids into compounds called *peptones;* the latter have the power to pass through membranes and so can be absorbed from the alimentary canal, while ordinary proteids cannot. The change from proteids to peptones is only for the purpose of absorption, for in the walls of the intestine the products of protein digestion are recombined to form tissue-building compounds that are taken up by the blood vessels and the lymphatics. There are on the market several preparations of predigested foods, known as beef peptones, milk peptones, etc. These are designed for convalescents and dyspeptics.

PEPYS, *peeps, pep'is,* or *peps,* SAMUEL (1633-1703), an English diarist. He was born in London and educated at Saint Paul's School and at Cambridge. Through the influence of Sir Edward Montagu, he was given a clerkship in the navy and later made secretary of the admiralty. At the time of the Popish plot he was accused of sharing in the conspiracy to overthrow Charles II and the power of Protestantism. The charge was false, and he was soon released without a trial and again given his office in the admiralty, which he kept until William and Mary came to the throne. From 1684 to 1686 he was president of the Royal Society. Pepys gave to Magdalene College, Cambridge, a library formed, in part, of a large number of old English ballads. He left memoirs of his experiences in the navy, and the celebrated *Diary,* which was written in a kind of shorthand and was first made readable by the Rev. J. Smith. It was published in 1825. This *Diary* covers the years from 1660 to 1669, and is a very valuable chronicle of the history of England during the reign of Charles II. It deals with great events and small, and as it has a large store of anecdote, and is written in lively style, it is as interesting as it is valuable.

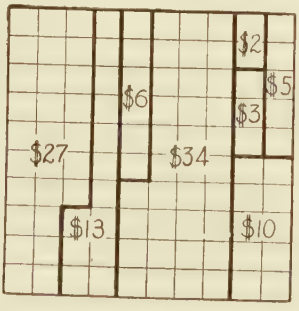
PEQUOT, *pe'kwot,* a quarrelsome tribe of the Algonquian family, which was almost wiped out in a war with the English settlers in 1637. The original home of the Pequots was in Eastern Connecticut, in the region of the Mystic River, on the banks of which they had built their principal fort. In an attack on this fort by a company of English under Captain John Mason about 600 Indians perished; many were shot while attempting to escape, and others were captured and sold into slavery.

THE STORY OF PERCENTAGE

PERCENTAGE, the process of computing by hundreds. The word is derived from the Latin *per*, meaning *by*, and *centum*, meaning *hundred*. The symbol for per cent is %.

The business world and the scientific world use per cent to express the number relations in which they are interested, instead of using the common fraction, halves, thirds, fourths, etc. This is not altogether a modern innovation, for we find that percentage was in use in centuries past. In the seventeenth century, for instance, La Salle, in his early settlement in Canada, took "6 measures out of every 100 measures" sent to him, which he had ground at the mill. So many out of 100 has seemed a simple method of designating parts. Today it is the general method of keeping records of scientific experiments, business ventures, and tests for efficiency in all lines. Thus we find expressed in per cents the humidity of the atmosphere, the relative values of foods, the proportions of materials in soils, the relative value of money investments, the relative efficiency of men as workers, and of teams as ball players, results of sociological research, birth rates, statistics as to fatalities resulting from various diseases, death rates, etc.

Illustrative Examples. A young man spent $100 for a vacation trip. He paid $27 for railroad fare; $13 for steamer fare; $6 for meals while traveling; a $34 hotel bill; $3 for transfer of baggage; $2 for reading matter; $5 for taxi fares, and $10 for amusements.



He spent $27 out of $100, or $^{27}/_{100}$, or 27 per cent, of his money for railroad fare. He spent $13 out of $100, or $^{13}/_{100}$, or 13 per cent, of his money for steamer fare. This may be tabulated as follows:

Railroad fare	= 27%	of $100
Steamer fare	= 13%	of $100
Meal bill	= 6%	of $100
Hotel bill	= 34%	of $100
Baggage bill	= 3%	of $100
Reading bill	= 2%	of $100
Taxi bill	= 5%	of $100
Amusement bill	= 10%	of $100
	100%	of $100

Finding Any Per Cent of a Number. Find 1% of the following: $600; $300; $1500; 900 miles; 12,000 feet; 1600 bushels.

Find 2% of each of the above; find 7% of each.

1% of $600 = $6.00 = $6
2% of $600 = 2 × $6 = $12

1% of 900 mi. = 9.00 mi. = 9 mi.
7% of 900 mi. = 63 mi.

To find one per cent of a number, divide it by 100. Do this in the shortest way, which is to move the decimal point two places to the left.

Find 1% of the following: 1250, 730, 280, 175, 125, 936, 24, 16, 8, 3, 11.5, 12.65, .84, 96, 7.

Find 8% of each of the above.

1% of 1250 = 12.50 = 12.5
8% of 1250 = 8 × 12.5 = 100.
1% of 24 = .24
8% of 24 = 8 × .24 = 1.92

1% of 3 = .03
8% of 3 = .24

1% of 11.5 = .115
8% of 11.5 = 8 × .115 = .92

1% of .84 = .0084
8% of .84 = 8 × .0084 = .0672

To find any per cent of a number move the decimal point two places to the left and multiply by the number denoting the per cent to be found; or *multiply by the number denoting the per cent, and point off the product,* thus:

6% of 725 = *n*; 12% of 8.3 = *n*

725	8.3
.06	.12
43.50	.996

Practical Problems. (1) A 20-acre field yielded 480 bushels of corn one year; the following year its product was increased 7⅜%. What was the value of the increase, corn selling at $1 per bushel?

First crop = 24 bu.
Number bu. increase = .07⅜ × 480 = 35.40
Value of increase = 35.40 × $1 = $35.40

(2) Sugar sold at 6½ cents per pound; it rose in price 50%. For what did it sell then?

First selling price = 6½¢
Increase = .50 × 6½¢ = 3¼¢
Second selling price = 6½¢ + 3¼¢ = 9¾¢

(3) Living expenses rose 35% from January to July. What salary should a man receive in July, who in January was getting $24 a week, so that the increase in salary will correspond to the increase in expenses?

(4) A school district receives $788.50 one year for expenses. The state pays 28% of it, the county 32% of it, and the district the rest of it. How much does each pay?

Whole tax = $788.50
State tax = .28 × $788.50 = $220.78
County tax = .32 × $788.50 = $252.32
District tax = (1.00 − .60) × $788.50 = $315.40

(5) If wheat selling at $1.90 falls 10%, for what does it sell?

(6) A record jump was 12 feet 9 inches. An athlete breaks the record by an increase of 2%. What is his jump? Answer, 13 feet .06 inches.

First record = 12 ft. 9 in.
Increase = .02 × (12 ft. 9 in.) = .24 ft. + .18 in.
New record = 12.24 ft. + 9.18 in.
.24 ft. = .24 × 12 in. = 2.88 in.
New record = 12 ft. + 2.88 in. + 9.18 in. = 13 ft. + .06 in.

Finding What Per Cent One Number Is of Another. Note the following:

$2 is what part of $8? ¼
$4 is what part of $8? ½
$3 is what part of $8? ⅜
$6 is what part of $8? ¾
$7 is what part of $8? ⅞

Express the above answers in hundredths:

¼ = 25/100, ½ = 50/100, ⅜ = $\frac{37\frac{1}{2}}{100}$, ¾ = 75/100, ⅞ = $\frac{87\frac{1}{2}}{100}$

Express with the symbol %:

$2 is 25% of $8
$4 is 50% of $8
$3 is 37½% of $8
$6 is 75% of $8
$7 is 87½% of $8

Common fractions may be expressed with the per cent sign:

⅕ = 20%, ⅖ = 40%, ⅗ = 60%, ⅘ = 80%, ⅓ = 33⅓%, ⅙ = 16⅔%, 1/9 = 11⅑%, 2/7 = 28⅐%, 1/12 = 8⅓%, 1/16 = 6¼%.

(Refer to Decimal Fractions for reduction of common fractions to decimal fractions.)

Any fractional part can be expressed as hundredths and therefore as per cent, as shown below:

135 trees in an orchard of 180 trees are cherry trees, 18 are plum trees and the rest are peach trees. What per cent of the orchard is cherry trees? Plum trees? Peach trees?

Number trees = 180
Part cherry = 135/180 = ¾ = 75%
Part plum = 18/180 = 1/10 = 10%
Part peach = 27/180 = 3/20 = 15%

This follows very simply from work in common fractions; we find what part one number is of another and express that part in hundredths or per cent.

Practical Problems. (1) A gardener planting 40 acres of land put 7 acres into sweet corn, 15 acres into potatoes, 13 acres into tomatoes and 5 acres into lettuce, radishes, etc. What per cent of his land is given to corn? Potatoes? Tomatoes? Lettuce?

Part to corn = 7/40 = $\frac{7.00}{40}$ = 17½%

Part to potatoes = 15/40 = $\frac{3.00}{8}$ = 37½%

Part to tomatoes = 13/40 = $\frac{13.00}{40}$ = 32½%

Part to lettuce = 5/40 = ⅛ = 12½%

(2) A man receives a salary of $135 a month He pays per month $25 for rent, $36 for food, $15 for clothes. What per cent of his salary does he pay for each?

Part for rent = 25/135 = $\frac{5.00}{27}$ = 18 5/27%

Part for food = 36/135 = $\frac{4.00}{15}$ = 26⅔%

Part for clothes = 15/135 = $\frac{1.00}{9}$ = 11⅑%

(3) 2800 pounds of milk from one dairy gave 84 pounds of butter fat; 2400 pounds from another dairy gave 84 pounds of fat. What per cent butter fat did the milk from each dairy give?

Number lb. of milk = 2800
Number lb. of fat = 84
Part fat = 84/2800 = 3/100 = 3%
Number lb. of milk = 2400
Number lb. of fat = 84
Part fat = 84/2400 = 7/200 = 3½%

(4) 4 inches is what per cent of 1 foot?

Part = 4/12 = 33⅓%

(5) 3 pecks is what per cent of 6 bushels?

Part $=\frac{3}{24}=\frac{1}{8}=12\frac{1}{2}\%$

(6) A baseball team during one season won 83 games and lost 57 games. What was the per cent of games won? Carry to one decimal place.

Number games played $=83+57=140$

Part won $=\frac{83}{140}=\frac{83.000}{140}=59.2\%$

(7) \$6 is what per cent of \$12?

(8) 1 pint is what per cent of 1 quart?

(9) 3 pecks is what per cent of 1 bushel?

(10) 3 inches is what per cent of 1 foot?

(11) 2 ounces is what per cent of 1 pound?

(12) 9 inches is what per cent of 1 yard?

(13) 1 foot 9 inches is what per cent of 14 feet?

(14) $6\frac{2}{3}$ miles is what per cent of 20 miles?

(15) A farmer raised corn last year on 68 acres. This year he adds 17 acres to his corn field. What per cent has he increased it?

(16) The drainage tax of some farm land along the Illinois River last year was \$45 per acre. This year it is \$60 per acre. What is the per cent of increase?

First tax $=\$45$
Increase $=\$15$
Rate of increase $=\frac{15}{45}=\frac{1}{3}=33\frac{1}{3}\%$

Finding a Number When a Per Cent of It Is Given. (1) 25% of Mr. Howard's farm is 78 acres. How many acres in the whole farm?

.25 of farm $=78$ A.
Number A. in farm $=4\times 78=312$

(2) 60% of Mr. Howard's crop of wheat last year was 7488 bushels. How many bushels in his entire crop?

.60 of crop $=7488$ bu.

Bu. in crop $=\frac{5}{3}$ of $\frac{2496}{7488}=12480$

or

$\frac{3}{5}$ of crop $=7488$ bu.
Bu. in crop $=\frac{5}{3}$ of $7488=12480$

or

$.60\times$ crop $=7488$ bu.

Bu. in crop $=\frac{7488.00}{.60}=12480$

Note in the last solution that 7488 is the product of the number of bushels in the whole crop and .60.

When the product of two numbers and one of the numbers are known, the other number is found by dividing the product by the number that is known. This principle runs through percentage in every division of the subject, interest, commission, profit and loss, and so forth. The following problems illustrate this:

(1) What sum of money on interest at 5% for 1 year gives \$337.50 interest?

$.05\times$ principal $=\$337.50$

Principal $=\frac{337.50}{.05}=\$6750$

(2) A commission agent working at $13\frac{1}{2}\%$ earned \$1687.50 selling machines. What was the amount of his sales?

$.13\frac{1}{2}\times$ sales $=\$1687.50$

Sales $=\frac{\$1687.500}{.135}=\$12500$

(3) A baseball team lost 32 games in one season and their per cent loss was $45\frac{5}{7}$. How many games did they play?

$.45\frac{5}{7}\times$ number $=32$

Number $=\frac{32.00}{.45\frac{5}{7}}=\frac{10}{3200}\times\frac{7}{320}=70$

A kind of problem arises in percentage which seems to *differ* from the problems just dealt with, but which is really the *same kind of problem;* for example:

(1) Mr. Jackman sold flour at \$11.60 per barrel, which was a gain of 16% to him. What did he pay for it?

Cost $+.16$ of cost $=\$11.60$
$1.16\times$ cost $=\$11.60$
Cost $=\frac{\$11.60}{1.16}=\$10$

In this problem \$11.60 is 116% of the cost, and is therefore the *product* of 1.16 and the cost, and the *cost* is found by dividing the *product,* or \$11.60, by 1.16, the *known factor.*

(2) An athlete's weight is 156 pounds, which shows a loss of 10% from his former weight. What was his former weight?

$.90\times$ former wt. $=156$ lb.

Former wt. in lb. $=\frac{156.00}{.90}=173\frac{1}{3}$

(3) I sold 2 cows for \$132 each. On one I gained 20% and on the other I lost 20%. Did I gain or lose on the sale? How much?

Cost $+.20$ cost $=\$132$
$1.20\times$ cost $=\$132$
Cost of first cow $=\frac{132.00}{1.20}=\$110$

Cost $-.20$ cost $=\$132$
$.80\times$ cost $=\$132$
Cost of second cow $=\frac{\$132.00}{.80}=\$165$

Net loss $=\$275-\$264=\$11$

This may be solved in common fractions:

$\frac{6}{5}$ of cost of first cow $=\$132$

Cost of first cow $=\frac{5}{6}$ of $\$132=\$110$

$\frac{4}{3}$ of cost of second cow $=\$132$

Cost of second cow $=\frac{3}{4}$ of $\$132=\$165$

Net loss $=\$275-\$264=\$11$

Problems in interest, commission, profit and loss, discount, taxes, insurance, and so on, come under one of the three divisions of percentage discussed here: (1) To find any per cent of any number. (2) To find what per cent one number is of another. (3) To find a number when a certain per cent of it is known. A.H.

PERCEPTION, *per sep' shun.* The mind is awakened to activity through impressions brought to it by the senses. Perception is the process of interpreting these impressions. Perception and observation are very much the same. The relation between perception and sensation is so close that we cannot separate them. Sensations grow into perceptions. A mere impression of color or sound is a sensation; that sensation interpreted becomes a perception, or a percept. For instance, a red ball passing before the eye produces a sensation of red upon the retina. If no attention is given it the observer does not know whether the sensation was caused by a ball or some other object. If attention is given this sensation, however, the observer at once interprets it in the light of former experiences. He recognizes its form and size and compares the object with other similar objects that he has observed before and decides that it is a ball. Perception, then, is sensation plus experience.

The growth of perception is very slow in young children, and their crude and ridiculous ideas are due to lack of experience. Perception is a progressive process, and the child corrects his ideas as his experience broadens. We have different ideas of the same object because we have had different experiences, and each person interprets each new impression in the light of his own experience. Many city children have no knowledge of the source of milk beyond the bottle in which it is delivered at the home. A country child has no better idea of the streets, buildings and other intricacies of a great city. Experience with country life is necessary for the city child, and experience with city life is equally necessary for the country child.

Training in Perception. Complete perception involves the use of all the senses that can be brought to bear upon an object. In order to get a complete idea of an orange, for example, the child must see it, handle it, taste it and smell it. If he looks at the orange it will be nothing more than a yellow ball to him. Parents and teachers often rely too much upon the eye in teaching young children. The child's instinct to handle things is not purposeless, since he gains ideas through the sense of touch that he can gain in no other way. Each sense should be trained. One of the chief educative values of kindergarten occupations, drawing and manual training exercises in the grades is that they enable the pupil to handle and fashion material and in this way to extend his powers of observation.

Another point that should also be remembered is that the child observes only one or two features of an object at one time, therefore repeated observations are necessary to gaining a complete idea. It is often advisable to direct the child's observation to some particular feature that he has previously overlooked.

Children and adults alike are prone to see what they expect to see; therefore anticipation is an important factor in training the observation. People often entertain erroneous ideas because of preconceived notions they have formed concerning objects they have never observed. Therefore a description of a new object before it is presented is sometimes helpful, especially if the object is complex. In this description emphasis should be placed on the features to which the child's attention should first be attracted.

Illusion and Hallucination. Illusions and hallucinations sometimes exert a strong influence over one's perceptions (see HALLUCINATION). The moon when near the horizon, for instance, appears larger than when it is near the zenith, and objects seen through a fog often appear to be greatly enlarged (see illustration, page 2836). The imagination is also a strong factor in the formation of ideas. Children who are told that the "bad man" will get them, or that all sorts of dire monsters are lurking in dark corners ready to pounce upon them if they do not behave, are constantly "seeing things" in the dark. The mere mention of such a practice is enough to lead those in care of small children to realize its evil consequences. W.F.R.

Consult Broad's *Perceptions, Physics and Reality;* James's *Principles of Psychology.*

Related Subjects. Perception is closely related to the following subjects, all of which are treated in these volumes:

Apperception	Eye
Attention	Imagination
Concept	Senses, Special

PERCH, a family of about 125 species of fresh-water fish, distributed in the cooler parts of the northern hemisphere. The perches have elongated bodies, either flattened or round, and small, rough scales. Two species well known

to American anglers are the *pike perch* and the *yellow perch*. The former, called locally *wall-eyed pike, salmon, jack salmon, blowfish, pike, dory* and other more or less appropriate names, is found abundantly throughout the Great Lakes region, and in many streams and lakes in the Mississippi Valley, especially those with clear water and rocky or sandy bottom. Individuals vary considerably in size, the largest specimens being three feet long and weighing twenty-five pounds. Those caught in the Great Lakes, however, are not usually over ten pounds in weight, and others are not more than two pounds. The prevailing color also varies, being yellow, gray or blue. The flesh is very agreeable and is firm and white. At Put-in-Bay, on Lake Erie, the United States Fish Commission has an important hatchery for the propagation of the pike perch.

The yellow perch, also abundant in the Great Lakes region, and in the lakes of New England and New York, is found as far north as Nova Scotia and the Saint Lawrence River, and it also inhabits most of the smaller lakes of the upper Mississippi Valley. The average fish is about a foot long and weighs two pounds or less. In color it is a golden yellow, of varying brightness; the sides are marked with several dark bars; the flesh is very sweet and appetizing. Yellow perch having a value of $300,000 are caught on the Great Lakes each year and shipped to inland markets.

PERENNIALS, *per en'i alz,* a term in botany, derived from two Latin words meaning *through* and *year,* and applied to plants that live and blossom for more than two years, sometimes, as in the case of trees, year after year, or indefinitely. Plants whose life-span is two years are called *biennials,* and those which live a single year are called *annuals.* This classification, however, is not hard and fast, for the above-ground parts of some plants are annual, while those below the soil are perennial. Some shrubs and herbs, such as the castor-oil plant, are perennials in their native habitat; nevertheless, when grown in cold climates, they live but a year. Therefore the term *perennial* is most commonly used to designate plants all parts of which endure for more than two years.

Related Subjects. The reader is referred to the following articles in these volumes:

Annuals	Botany
Biennials	Plant

PERFECTIONISTS, *per fek'shun ists.* See Oneida Community.

PERFUME, *pur'fume.* We read in the Bible that when the wise men from the East came to visit the child Jesus they brought with them costly gifts, among which were gold and the sweet-scented gums, frankincense and myrrh. As far back as we can trace religious ceremonies we find that perfumes, usually in the form of incense, were associated with them, and it is probable that from this association arose the ancient custom of presenting the gums as a token of esteem for the one to whom they were given. Be this as it may, perfumes have been held in high regard in all ages, and their manufacture to-day may be considered as one of the fine arts. Perfumes may be classified as animal, vegetable and artificial.

Animal Perfumes. The animal odors used in perfumery are ambergris, castor, civet and musk. (Each of these except castor is described under its title; for castor, see Beaver.) Animal odors are of great value because of their permanence and their penetrating power. Musk and civet, for instance, will impart their aroma to objects without coming in contact with them. Preparations of animal perfumes are used in the manufacture of various perfumes into which they enter in small proportions. Civet is extensively employed in sachet and other toilet powders. Musk constitutes the foundation of many perfumes. Tonquin musk, which is the highest grade, is worth $25 an ounce, and is the most expensive animal perfume. Castor has a fixing power equal to that of musk, and dilute tinctures of it are extensively used.

In concentrated form all these perfumes are so strong as to be nauseating, and their preparation for the market requires skill and care. The original substances are soaked or macerated in alcohol to form tinctures; these are so strong that they can be used only in small quantities in the preparation of the perfumes.

Vegetable Perfumes. There are so many vegetable perfumes that it is impracticable to name them all. Odor-bearing plants contain little sacs or glands in which the odoriferous substance is stored, and the part of the plant used in its extraction is the part in which these glands are found in the largest numbers. The most delicate perfumes come from the blossom, as in case of the rose, the violet and the heliotrope. The oils of these flowers are extracted by distillation, as in making the attar of roses, and by the use of fats for more delicate perfumes. Glass vessels are lined with fat, and the petals of the flowers are spread over its surface. The fat extracts the oil, and one sup-

ply of petals follows another until the fat becomes saturated. It is then placed in closed vessels with alcohol and heated. The alcohol dissolves the essential oil of the flower and rises to the top of the liquid, from which it is easily separated.

Some oils are found in the rind, as are those of the orange and the lemon. Those of the mints occur in the leaves and stems and are obtained by distillation. The odor-bearing part of the cinnamon is the bark. Rosewood, cedar and sandalwood bear their odors in the wood. Cloves and nutmeg bear them in the seed, and the sweet-smelling gums are obtained by bruising or cutting the trees. Whatever the method of extraction may be, the product reaches the manufacturer of perfumes in concentrated form. Great skill and long experience are necessary to the successful extraction of these perfumes, or the product obtained may have a scent entirely different from that desired. This is especially true of odors from flowers. Unless the blossoms are gathered at a certain stage of their development the best results cannot be obtained.

Artificial Perfumes. Chemists have discovered what substances constitute the animal and vegetable perfumes and the proportions in which they combine in each perfume. Since some of these substances can be manufactured more cheaply than they can be obtained from their natural sources, the manufacture of artificial perfumes has become an industry of considerable importance. So skilfully is the work done that it is difficult to detect the artificial perfume from the natural one it is intended to replace. German chemists have taken the lead in this industry.

Manufacture and Use. The perfumes of commerce consist of various combinations of the animal, vegetable and artificial perfumes, dissolved in alcohol and water. By varying the proportion different perfumes are prepared from the same ingredients. Those of the best quality contain a larger proportion of animal perfumes than the less expensive preparations. Such perfumes as cologne and Florida water consist of water in which very small quantities of the odor-bearing essences have been dissolved.

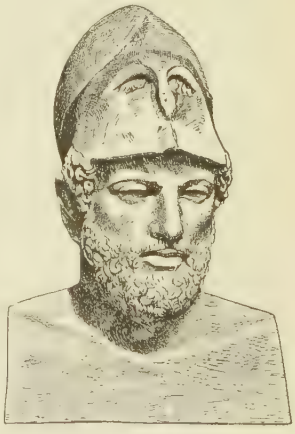
France is the leading country in the manufacture of perfumes. At Cannes, Nice, Nimes and Paris there are extensive manufactories. England leads in the production of lavender, and Turkey is noted for its attar of roses (see ATTAR).

Perfumes are used in commerce for imparting a pleasant odor to tooth pastes, cosmetics, soaps and other preparations used in the home. We most frequently associate their use, however, with the toilet, and it is for this purpose that the most costly preparations are made. Used too lavishly, however, perfumes violate the canons of good taste. W.F.R.

Consult Askinson's *Perfumes and Cosmetics.*

PERICARDIUM, *per·i·kar'di·um,* a cone-shaped bag or sac of connective tissue which encloses the heart and a small portion of the large blood vessels at the base of that organ. The apex of the pericardium is behind the breastbone, and its base is attached to the upper surface of the diaphragm. It has a lining of smooth, serous membrane (see MEMBRANES), which entirely covers the heart; the inner surface of this lining secretes a lubricating fluid that serves to lessen the friction that would otherwise result from the movements of the heart. The outer layer of the pericardium consists of strong, interlacing fibers. When the sac becomes inflamed it causes the disease known as pericarditis. See HEART, subhead *Diseases of the Heart.*

PERICLES, *per'i·kleez* (? -429 B.C.), a Greek statesman who gave his name to the most glorious period of the greatest of Greek states. He was born at Athens, of a noble family, and was educated by the greatest philosophers of his day, but when he entered public life it was as the advocate of the rights of the common people. For thirty years he stood practically supreme in Athens, and the "Age of Pericles" became the symbol for all that was highest in the art and science of the ancient world.



PERICLES
From a statue in the Vatican, Rome.

The Reforms He Instituted. Pericles found Athens in the hands of the aristocracy, who alone could hold the higher offices; he made of it a complete democracy in which every citizen was eligible to any office. This was accomplished in the

face of serious opposition, at first from Cimon and later from Thucydides, but both these rivals were banished. One great obstacle to the success of Pericles was the Areopagus, the chief Athenian court, but he succeeded in divesting this of all its valuable political power.

Public officials in Athens before this time had been unpaid, but Pericles introduced salaries, first for the archons and later for all offices. He also provided that the state should pay the admission fees to the theater for all who could not afford to do it themselves, attendance on the drama being a religious rite. As ardently as he hoped to make Athens a democracy, he hoped also to make it supreme in Greece, even dreaming of a league which should unite all the Greek states under the leadership of Athens.

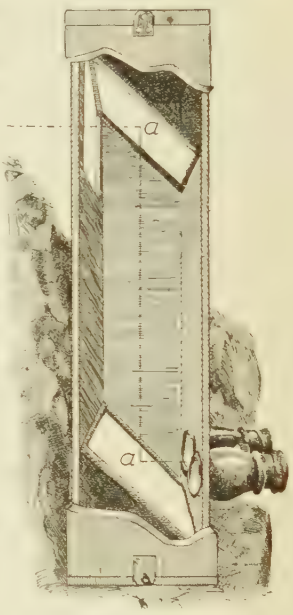
Beautiful Athens. In pursuance of his designs Aegina and Naupactus were reduced. Euboea was won back and Samos was subdued. The subject states poured money into the Athenian treasury, and with these funds Pericles embellished the city. The temple of Athena Nike, the Propylaea, and greatest of all, the Parthenon, were but a few of the magnificent works which were produced under his guidance. These gave employment to many men, and Athens enjoyed a period of unexampled prosperity. Literature and philosophy flourished also, and had their part in making Athens the cultural center of Greece.

Died at Height of Power. As to how large a part Pericles had in bringing on the Peloponnesian War there has been considerable discussion. The basal cause, however, was the jealousy of Sparta towards Athens, and the conflict could not well have been avoided. Pericles called into the city all the inhabitants of the surrounding district, which he allowed the Spartans and their allies to ravage as they pleased, while he made plans to retaliate by means of a navy. In 430 B. C. the plague broke out in Athens, and the mortality was terrible. Blaming Pericles for their woes the people deposed him, but he was soon recalled and made even more powerful than before. The plague, however, attacked him, and in 429 B. C. he died. A. MC C.

In addition to references above, see ATHENS, subhead *The Ancient City;* for the social aspects of his career see ASPASIA. Consult Abbott's *Pericles and the Golden Age of Athens.*

PERIGEE, *per'ije,* from two Greek words meaning *near* and *earth,* is applied in astronomy to that part of the moon's orbit which is nearest the earth's surface. When at this point, the moon is said to be *in perigee.* The word at one time was used to designate the similar portions of the orbit of any heavenly body. The point opposite the perigee is called the *apogee.* See MOON; APSIDES.

PERIPATETIC, *peripatet'ik,* **SCHOOL OF PHILOSOPHY,** the followers of the Greek philosopher, Aristotle, so called from Aristotle's habit of walking about beneath the porticoes of the Lyceum at Athens as he lectured. The word *peripatetic* is derived from a Greek word meaning *given to walking about.* Aristotle's philosophy is the culmination of that developed under his predecessors, Socrates and Plato, and is based on the principle that all thinking must be founded upon the observation of facts. It was Aristotle's systematic mind that first divided philosophy into its departments of ethics, psychology, logic, etc., and he is known as the founder of these as separate sciences. The Peripatetic School was greatly aided in its researches by the gifts of Alexander the Great, who when a lad was tutored by Aristotle. See ARISTOTLE; PHILOSOPHY.



PRINCIPLE OF THE PERISCOPE

This crude device was developed to aid in trench warfare on the battle fields of Europe before the end of 1914. Two mirrors (*a a*) are placed in such positions that beams of light entering the open space at the top are reflected into the field glasses. The periscope is not a new idea in mechanics; it applies the physical laws that light travels in a straight line and that the angle of incidence equals the angle of reflection. (See page 3424.) The submarine periscope is still further perfected.

PERISCOPE, the "eye" of a submarine. It is an optical instrument by which objects or ships which are on the surface of the water can be seen at a distance from the inside of a submerged submarine, and is constructed upon the same principles as the telescope (which see). In its simplest form it consists of a vertical tube which is provided at each end with a reflecting mirror or prism. These reflecting surfaces are

parallel and arranged at an angle of 45° with the axis of the tube. Between them there are several lenses. The tube, which can be moved in any direction by the observer, is within a strong stationary outer tube; the head of the latter is attached to the inside tube and moves together with it. When the periscope is above the surface of the water the mirror at the upper end catches the reflection of objects in front of it. The images formed are then transmitted to the mirror at the lower end, and, as perfected for submarine warfare, the objects become visible by reflection upon a flat table below. The periscope is useful only during daytime when there is sunlight, but it enormously increases the fighting value of the submarine.

See SUBMARINE, for detailed illustration of the periscope as used on shipboard.

PERITONEUM, *per i toh ne' um,* a thin membrane which lines the abdominal cavity, and covers its enclosed organs and those of the pelvis. The peritoneum is the most important of the serous membranes; its inner layer is arranged in folds which serve to keep the organs in position. Freedom of movement of these organs is made possible by a thin fluid which moistens the inside of the peritoneum. Inflammation of this membrane is known as peritonitis.

Related Subjects. The reader is referred to the following articles in these volumes:

Abdomen	Pelvis
Membranes	Peritonitis

PERITONITIS, *per i toh ni' tis,* inflammation of the serous membrane which lines the abdominal cavity (see PERITONEUM). Characteristic symptoms of acute peritonitis, the most common form, are chills, severe pain in the abdomen, difficult and painful breathing, rapid pulse and vomiting. Fever may or may not be present. The patient must rest quietly in bed until recovery. In some cases an attack is checked at the beginning by the use of ice bags and the administration of calomel or other purgative. Washing out of the lower bowel and the administration of opium to relieve pain are standard measures of relief for severe cases. What is known as perforative peritonitis is caused by infection from appendicitis or ulcer of the stomach or bowels.

PERJURY, *per' ju ri,* the offense committed by a person who, having been sworn to tell the truth in a matter pending in a court of justice, wilfully and deliberately takes a false oath. To constitute perjury, a statement must not only be made under oath in a judicial proceeding, but must be material to, or have direct bearing on, the issue which is being tried. If, however, a witness makes a misstatement unintentionally, or a mistake is made, it is not considered perjury by most authorities. *Subornation of perjury* consists in inciting or procuring another to commit perjury, and one found guilty of such act may be indicted and punished. Perjury generally is a *misdemeanor,* and is punishable as such, but has been made a *felony* in some jurisdictions. (Both of these terms are explained in these volumes under their titles.) The punishment for perjury in any case in which the Federal law authorizes an oath to be administered is a fine of not more than $2,000 and imprisonment for not more than five years, and, until the judgment is reversed, the person is rendered incapable of testifying in any United States court.

PERLEY, *pur' li,* SIR GEORGE HALSEY (1857-), a Canadian manufacturer and business man who turned to a public career after he had reached middle age, and in politics duplicated the success he had previously won in business. Since 1913, when Lord Strathcona died, Sir George has been acting as High Commissioner for Canada to Great Britain. During the War of the Nations he rendered conspicuous service, at first in bringing home to Canadians the nature and extent of the conflict in which the Empire was engaged, and later in securing and developing Canadian coöperation with the Mother Country. In partial recognition of this service King George, in 1915, created him Knight Commander of the Order of Saint Michael and Saint George (K. C. M. G.).

Perley is one of the few Canadians in high station who were both born and educated in the United States. He was born at Lebanon, N. H., attended the famous Saint Paul's School in the near-by town of Concord, and was graduated from Harvard University in 1878. He began his business career in Canada, becoming first a lumber merchant. Later he became interested in several manufacturing enterprises, banks and railroads, through which he amassed a considerable fortune. Sir George, in fact, is reported one of the wealthiest men in the Dominion. In 1900 and 1902 he was an unsuccessful Conservative candidate for the House of Commons, but in 1904 was elected. In 1911 he was chief whip for the Conservative party, and was a conspicuous opponent of the reciprocity treaty with the United States. On the fall of the Laurier Ministry it was common re-

port that Perley could have any office he chose in the new Borden Ministry, a report which is no less a tribute to his personal popularity than to his recognized ability and political influence. He preferred, however, to act as Minister without Portfolio, a position he retained until 1913, when he succeeded Lord Strathcona in London.

PERMIAN, *pur'mi an,* **PERIOD,** the last division of time in the Paleozoic Era, and extending from the Carboniferous Period to the Triassic Period in the Cenozoic Era. The article Geology presents a graphic illustration which makes its location quite clear. The period was characterized in North America by a general rise of the land, so that large areas formerly covered by the sea became dry land. The forming of the Appalachian Mountains was completed and the Ouachita Mountains appeared. Extensive Permian formations are found in the central part of the United States and in the staked plains of Texas. The rocks are chiefly limestone, sandstone and shale. In the early part of the period deposits of coal were formed in Pennsylvania.

The great geographic changes of the period had a disastrous effect upon both plant and animal life, and Permian rocks contain but few fossils. Those that have been found show a decline in the plants of the Carboniferous Period and an approach to those with which we are familiar. There were trees resembling the cone-bearing trees of the present, and ferns similar to those now common have left their impression on the rocks.

Reptiles appeared for the first time. In Texas, Kansas and Illinois skeletons of lizards from three to ten feet large have been found. Fossils of fish in both fresh and salt water show that they were not totally destroyed in the changes that followed the Devonian Period.

In the Old World the Permian system is more extensive than in America. Formations occur in Europe, Africa and Australia, and in Africa animal life was developed more fully than elsewhere. In Cape Colony skeletons of large animals which seem to form the connecting link between reptiles and mammals have been found.

Related Subjects. The reader is referred to the following articles in these volumes:

Geology (Illustration on page 2439) Carboniferous Period
Triassic System

PERNAMBUCO, *per nahm boo'ko,* the capital of the state of Pernambuco, and the most important sugar market in Brazil. It occupies the most eastern point of the Brazilian coast and of the South American continent, and consists of three distinct sections. Recife, built on a sandy peninsula which is joined to the mainland by an isthmus, is the seat of commerce. São Antonio, on the island of the same name, and connected with the mainland by several bridges, has many of the public buildings. Boa Vista, on the mainland, is the fashionable residence district. Because of several river channels within the city, Pernambuco is sometimes called the "Venice of America."

It is a modern, progressive city, with handsome public buildings and churches and many excellent charitable and educational institutions. In the residence section are wide avenues and beautiful gardens. The city has about fifty sugar factories, and is an important outlet for sugar, cotton, coffee, cacao and other products of Brazil. The inner harbor, which is protected by a long outer reef or rock, is being improved to make it accessible for the largest ocean vessels. Pernambuco is nearer European ports than any other South American city of importance, being 4,144 miles from London, as compared with 5,204 for Rio de Janeiro and 6,294 for Buenos Aires. In 1921 its population was reported as 216,484.

PEROXIDE OF HYDROGEN, *per ox'sid, hi' dro jen.* See Hydrogen Peroxide.

PERPETUAL MOTION, the name applied to a mechanical device which its would-be inventor alleges will operate continuously by its own power. The idea that a machine can be operated by the energy it itself creates is false, because energy (which see) cannot be created. By means of a water wheel and a dynamo electric machine the energy in falling water may be transformed into electrical energy that will operate machinery or perform other work, but the electric motor cannot generate the current by which it is operated, neither can the steam engine produce the steam necessary to run it. What is true of these machines is true of all others; a moment spent in clear thinking should convince any sober-minded person of the fallacy underlying the perpetual motion idea. Nevertheless, men have sunk fortunes and lost their minds in pursuit of this will-o'-the-wisp.

PERRAULT, *peh ro',* Charles (1628-1703), a writer of fanciful fairy stories that have grown in popularity for two hundred years, and have been endlessly retold, changed and colored to suit the taste of the countries which adopted them. He put into readable form *Little Red Riding-Hood, Sleeping Beauty, Bluebeard,*

Diamonds and Toads, Cinderella, Puss in Boots and many more of our best-loved fairy tales, and so brought them to the knowledge of the literary world. Perrault was born in Paris, and educated at the College de Beauvais. He studied for the law, but abandoned that profession after a year's practice, to devote himself to literature. His "Mother Goose" stories were published anonymously in book form in 1697, with a dedication signed by his son. Like the Brothers Grimm, of Germany, Perrault made use of the folklore tales that had been passed from generation to generation by word of mouth. An excellent adaptation of the stories, by Andrew Lang, is published under the title *Popular Tales.*

PER'RY, Bliss (1860-), an American author, editor and university professor. Since 1907 he has occupied the chair of English literature (belles-lettres) at Harvard University, and thus is a successor of Longfellow and of Lowell. He was born at Williamstown, Mass., the son of Arthur Latham Perry, an eminent political economist. Bliss Perry was graduated at Williams College in 1881, taking his master's degree there two years later. He studied later at the universities of Berlin and Strassburg, and has received honorary degrees from Princeton and other American institutions. Before he accepted the post at Harvard he was professor of English at Williams College (1886-1893) and at Princeton University (1893-1900), and for ten years following 1899 he edited the *Atlantic Monthly.* In 1909-1910 he represented Harvard at the University of Paris as special lecturer.

Professor Perry is widely known as general editor of the Cambridge editions of the poets, and as editor of the "Little Masterpieces." His writings include *Salem Kittredge, and Other Stories; The Powers at Play* (a novel); *A Study of Prose Fiction; Walt Whitman; Whittier; The American Mind;* and *Thomas Carlyle: How to Know Him* (1915).

PERRY, Matthew Calbraith (1794-1858), an American naval officer who opened the civilization of the world to medieval Japan, was born at Kingston, R. I. His father, Christopher Perry, was a "fighting Quaker," and his mother an Irishwoman of brilliant mind, who took great pains with the education of her children. Matthew attended private schools, and in 1809 enlisted as midshipman on the *Revenge,* and the next year was transferred to the *President.* He then served three years on the *Belvidere,* the ship which fired the first hostile shot in the War of 1812. In 1813 he was made lieutenant and accompanied his brother, Oliver Hazard Perry, when the latter left the *Lawrence* for the *Niagara,* in the memorable Battle of Lake Erie.

MATTHEW C. PERRY
The man who awoke a sleeping medieval giant which developed within fifty years to be the fifth naval power in the world.

Perry made a study of ship hygiene, the rules he formulated for discipline in his African station being in force for many years. He also wrote a treatise on the prevention of scurvy among sailors, and after studying the question of recruiting, founded the first naval apprentice system. In 1827 he was advanced to the rank of captain. As commander of the *Concord* in 1829, he took John Randolph, envoy to the Czar, to Russia, the *Concord* being the first United States man-of-war to enter Russian waters. While there, Perry was offered a position of high rank in the Russian navy, which, however, he declined. He was in command of the *Brandywine* at Naples, and later served on shore duty in the Brooklyn navy yards. There under his superintendence was built the first steam war vessel of the United States navy, the *Fulton II,* of which he had command from 1838 to 1840; in 1841 he received the rank of commodore. During the Mexican War he had charge of the American fleet for a time, and in the siege of Vera Cruz his ship's guns made a fifty-foot breach in the walls of the city.

Perry spent much time in research on naval matters, and was one of the chief educators of the United States navy. It was he who urged the adoption of rams on war vessels.

In 1853, Perry organized and commanded the expedition to Japan, in its results one of the most notable enterprises in American history. Japan had lived for centuries in isolation, and preferred to continue in medievalism, but by rare diplomacy Perry effected a treaty by which Japan granted trade relations with the United States. Then followed in Japan the most rapid development any nation has ever known.

Consult Griffis' *Matthew Calbraith Perry, a Typical American Naval Officer.*

PERRY, Oliver Hazard (1785-1819), an American naval officer, who by his courage and intrepid leadership in the War of 1812 forced an entire British squadron to surrender, was born in Kingston, R. I. His father, Christopher Perry, had won distinction in naval service, and his mother, Sarah Alexander, was a woman of high ideals. He was an elder brother of Matthew C. Perry (see above).

OLIVER HAZARD PERRY

Oliver attended private schools, and was a pupil of Count Rochambeau, one of the notable Frenchmen who served in the American army during the Revolutionary War. In 1799 he went as midshipman to the West Indies. He also took part in the Tripolitan War (see Barbary States). In 1807 the rank of lieutenant was given him. Like his father, he was interested in the building of war vessels, and was a fine tactician and disciplinarian.

Perry applied many times for a sea command, but being unable to secure one offered his services on the Great Lakes in the second war for American independence (see War of 1812). Commander Chauncey sent him to Lake Erie, where by strenuous endeavor he collected a force of vessels—among them the *Lawrence* and *Niagara*—and left Put-in-Bay September 10, 1813, to meet the British. At eleven o'clock that day, the battle began, with Perry on the *Lawrence*. The British guns had the advantage, and soon reduced that vessel to wreckage. Perry, with quick decision and dauntless courage, ordered four seamen to man a rowboat, and taking his brother, hurried for the *Niagara*, which had fallen behind. Two British vessels became entangled, and taking advantage of this the *Niagara* raked them with broadsides. By three o'clock the British fleet of sixteen vessels had surrendered to a young man twenty-seven years of age. For the first time in history England lost an entire squadron, and the victor was advanced to the rank of captain. Perry sent to General William Henry Harrison, military commander in the West, the famous message, "We have met the enemy, and they are ours." The victory was not won, however, without heavy loss of life.

He took part also in the battles around Detroit and on the Thames in Canada (1813), and later commanded the frigate *Java* in the Mediterranean. While on this trip he was stricken with yellow fever and died at Port of Spain, Trinidad, in 1819. In the rotunda of the Capitol at Washington is a painting showing Perry leaving the *Lawrence* for the *Niagara*.

An illustration drawn from the painting referred to above appears on page 2070, in article Erie, subhead *Battle of Lake Erie.*

Perry Centennial, an impressive celebration, in 1913, of the hundredth anniversary of the victory of Oliver H. Perry, in the famous Battle of Lake Erie. This victory, with the laconic dispatch announcing it, had endeared Perry to every American heart, and the celebration aroused wide enthusiasm. The idea of the centennial originated in Ohio, but nine other states sent commissioners to join in the plans which, when completed, centered about the Perry Memorial designed for erection on Put-in-Bay Island. This memorial is an ambitious structure which includes a plaza twelve feet in height, sloping from the water's edge and crowned with a Doric column 335 feet in height. The column, of massive granite, has a diameter of forty-five feet at its base and thirty-five at the top.

To assist in the celebration, Perry's flagship, the *Niagara,* which had been aground at Erie, was raised and restored as nearly as possible to its condition at the time of the battle. It made a triumphal progress about the lake, reaching Put-in-Bay on September 10, the anniversary of the great battle. The Memorial was dedicated with fitting services, the impressive culmination of which was the disinterring from the shores of Put-in-Bay of the English and American officers killed in the battle, and their reburial in the crypt of the Memorial.

Consult Mackenzie's *Commodore Oliver Hazard Perry;* Barnes's *The Hero of Erie.*

PERRYVILLE, Battle of, a battle of the War of Secession, fought October 8, 1862, between a Federal force of 22,000 under General Buell and about 17,000 Confederates commanded by General Bragg. After the evacuation of Corinth, Bragg decided to advance into Kentucky and Tennessee, but was overtaken at Perryville, Ky., where Polk of the Confederates opened the battle by an attack on the left wing of the Federal army under General McCook. At first the Confederates were success-

ful, but were finally driven back, and after retreating during the darkness joined forces with General Smith at Harrodsburg. The Federal loss in wounded and killed was about 4,000; the Confederates lost about 3,500.

PERSEPHONE, *per sef'o ne,* the Greek name for Proserpina (which see).

PERSEP'OLIS, the ancient capital of the Persian Empire, a city whose splendor and magnificence were a source of wonder to the Greeks. Its site is marked by a series of ruins, including huge marble columns, vast portals, tombs and sculptured figures. It lay in the fertile valley of the Medus River, about thirty-five miles northeast of the modern city of Shiraz, and became the capital of Persia under Darius I. In 331 B.C. the city surrendered to Alexander the Great, who sacked it and massacred the inhabitants. About A.D. 200 another city, Istakhr, rose on its ruins, but this, too, has passed out of existence.

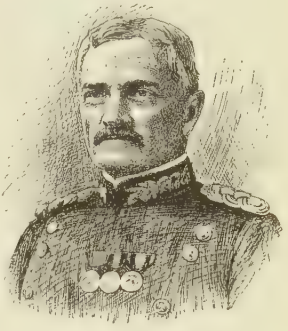
PERSEUS, *per'se us,* or *pur'sus,* the son of Jupiter and Danae, in an old Grecian myth. When he was sent on a terrible journey to slay the Gorgon Medusa, the gods who had so carefully watched over him during the perils of his youth came again to his aid. Pluto lent him a helmet that made him invisible; Minerva lent him her magic shield which inspired terror in every beholder; and Mercury furnished him with winged sandals. Armed in this manner Perseus flew to a land of perpetual darkness, the home of the Graeae, who alone knew where Medusa dwelt. The Graeae were three hideous sisters who had among them but one tooth and one eye, which they used in turn. Perseus, rendered invisible by his helmet, snatched the eye as it was passing among them and refused to return it till they told him where Medusa lived.

Having gained this information, he flew on to Medusa's home, where he found her asleep. Remembering the strange power of her face, he held his mirroring shield before him, and watching only the reflection of Medusa there, he cut off her head with one blow of his sword. Then holding the head far above his sight, he flew hastily back, fearing the revenge of the sister Gorgons. From the drops of blood that streamed into the ocean Neptune fashioned his famous steed Pegasus, and from those that fell into the hot African sands a race of poisonous reptiles sprang. To the suffering Atlas Perseus showed the head, and the giant became the mountain range. On his way, too, he rescued Andromeda, who had been chained to a rock and left to perish, and he married her. The shield, helmet and sandals he gratefully returned to the gods who had aided him, and the head of Medusa he presented to Minerva, who fixed it in the center of her terrible shield. Then Perseus, on his return to Thessaly, accidentally slew his grandfather Acrisius. Later, he ruled wisely and well over Mycenae, and at his death the gods placed him and Andromeda, with her mother, Cassiopeia, as constellations in the heavens, where they may still be seen.

Related Subjects. The following articles in these volumes are of interest in this connection:

Andromeda
Atlas
Mercury
Minerva

PERSHING, *pur'shing,* JOHN JOSEPH (1860-), an American soldier whose promotion to the rank of major-general, in 1916, made him, next to Major-General Wood, the youngest officer of that rank in the United States army. In 1918 in France he was raised to the full rank of general. He is a native of Missouri and a graduate of the normal school at Kirksville (Mo.) and of the Military Academy at West Point. In the year of his graduation from the latter institution (1886) he took part in the campaign against the Apaches, later commanded the Indian scouts in the war against the Sioux, and in 1891-1895 was military instructor at the University of Nebraska. When the Spanish-American War broke out he was acting as instructor in tactics at West Point, but he immediately went into active service and fought with the Tenth Cavalry during the Santiago campaign, holding then the rank of first lieutenant. After the occupation of the Philippines he organized the Bureau of Insular Affairs of the War Department and was appointed first chief of the Bureau.

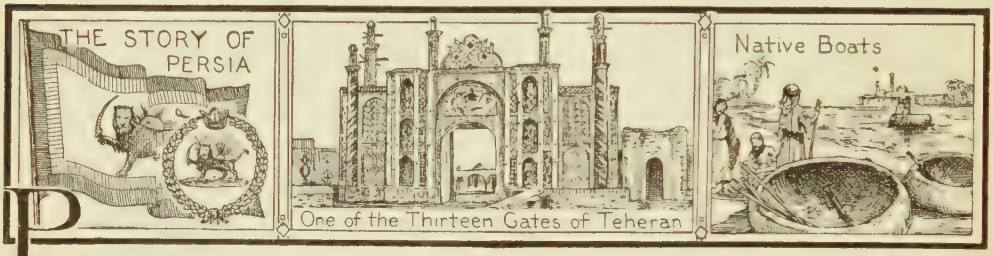


JOHN J. PERSHING
The first military commander in charge of a United States army sent overseas.

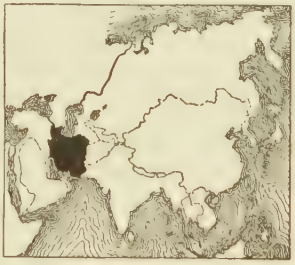
During his stay in the Philippines (1899-1903) Pershing was made commander of military operations in Central Mindanao against the Moros, and his excellent work won him the appointment of military governor of the islands. After the outbreak of the Russo-Japanese War he became military attaché at Tokyo and ac-

companied General Kuroki's army to Manchuria. On the conclusion of that conflict he was transferred by the United States government to the Philippines, and in 1906 he was promoted to the rank of brigadier-general. Appointed governor of the province of Moro, he won brilliant success as commander of the campaign against the rebellious Moros, completely defeating them at Bagsag (1913).

He was subsequently stationed at San Francisco, as commanding officer of the Eighth Brigade, and in 1914, when relations between Mexico and the United States became strained, he was ordered to the border. The raid on Columbus, N. M., by Villa's company of bandits, in the spring of 1916, brought matters to a crisis, and President Wilson then placed General Pershing in charge of the expeditionary forces in Mexico (see MEXICO, subtitle *Government and History*). His services in this campaign were fully appreciated by the country, and after America joined the entente allies in the War of the Nations he was given chief command of the American army in Europe. In 1921 he became head of the general staff of the army. See WAR OF THE NATIONS.



PERSIA, *pur'sha*, a country of Western Asia, with a history reaching back to memorable periods hundreds of years before the birth of Christ. To-day, however, it is little known by the peoples of the world except as a semi-desert area and an unimportant factor in world development. After the beginning of the twentieth century it became a fighting ground through the medium of diplomacy between two of the great powers of Europe, with a third viewing the situation with envious eyes. Its geographical position renders it necessary to Russia, Britain and Germany, in their far-flung schemes of empire.



LOCATION MAP
Showing the size of Persia in comparison with the entire continent of Asia.

"Persia's light is going out," is the way the world's politicians phrase it. The mightiest empire of ancient days is now actually but a strip of territory between the Caspian Sea and the Persian Gulf, for only here is the ruler's power yet absolute, although on all maps Persia occupies a great area of 628,000 square miles—two-thirds as large as the entire United States east of the Mississippi River.

Russia and Britain agreed between themselves in 1907 to limit their respective "spheres of influence" in Persia to the provinces adjoining the Russian frontier, on the north, but extending below the capital city, and the provinces on the south lying close to British India. The map on page 4593 indicates roughly the practical division of this territory, and shows the central territory over which the native ruler's sway is yet absolute. It must be said that both Russia and Britain agreed to respect the integrity and independence of Persia throughout its entire territory, with the exception of supervision of finances, which in an emergency they should control. If Germany secures the same privileges on Persian soil that the above two European powers enjoy it must of necessity be along the Turkish border, and German influence in Turkey points to that possibility.

The People. The original inhabitants of Persia, the ancient Iranians and founders of the Aryan race, lived in the southwestern part of the plateau, anciently known as *Persis*. The modern Persians are of the Aryan stock, mixed with the blood of the Mongol, Tartar, Arab and Turkish settlers. They are of two classes, the dwellers in towns and the roaming herdsmen, the nomadic dwellers in tents (see NOMAD LIFE). This latter class includes tribes of Arabs, gypsies, Turks and Kurds, many of them outlaws and brigands, serving their own particular chieftains.

The Persian is more active in mind and body than the Turk, but is a true Oriental, ceremonious and impractical, a dreamer, not a man of action, and religious rather than moral. The ancestor worship and reverence for parents and

BRITISH AND RUSSIAN "SPHERES"
(*a*) Russia's influence is predominant here; (*b*) in the southern section Britain maintains supremacy, thus protecting its Indian empire.

ruler, characteristic of the Chinese, are also Persian traits. In 1922 the population was estimated at 9,500,000, of which number 2,000 were Europeans; there were only fifteen people to the square mile.

Ninety per cent of the natives are Mohammedans of the Shiite sect. There are about 10,000 Parsees, 40,000 Jews and 80,000 Armenians and Christians; many of these were massacred by the Turks and Kurds in 1914 and 1915.

Persia is the only one of the Tigris-Euphrates group of nations that for a long time has had a national system of education. Private tutors are employed by the richer class. There are national schools where children are taught the *Koran,* and colleges giving instruction in religion and in the Persian and Arabic languages. There are two military colleges, and normal and polytechnical schools at Teheran. United States and British missionaries are encouraging the education of women. An educational council has been appointed by the government, and many schools on European lines have been opened. According to European estimate 10,000 pupils of both sexes are enroled in Persian schools.

Industries. Persia is not an agricultural nation. Much of the arable land is not utilized, and the means of tillage are primitive; but where the natives are industrious, cereals, peas, beans, sugar cane and indigo are raised, and large quantities of fruits, gums, cotton and Persian tobacco, which is of a superior quality, are exported. Since the suppression of the opium trade in China, Persian poppy fields have yielded an export of opium averaging 6,000 chests a year.

The natives not living in cities are chiefly a pastoral people, keeping large herds of goats and sheep famous for their fine wool, and animal products constitute a large part of the country's wealth.

There are no large factories in Persia; the manufacturing is done in private shops or schools where artistic silk and woolen tissues and the famous Kirman goat's hair shawls are woven, and enameled metal filigree work is done. Most important of the manufactured exports of Persia are the handmade carpets of thirty different kinds, each district of the country having its characteristic pattern. These rugs are made of a particularly fine variety of wool colored by native dyes. The export of Persian carpets valued at about $5,700,000 every year.

The manufacturing arts of Persia for some time have been declining, owing to the government's neglect of such industries, poor transportation, the advent of European products and the indifference of the natives themselves. Over sixty per cent of Persia's commerce is carried on with Russia, twenty per cent is with England, and most of the remainder is with Afghanistan and India. By treaty in 1903, duties upon English and Russian imports were made uniform.

Mineral Resources. The mountains of Persia contain great but undeveloped mineral wealth. The tin, iron, copper, lead and coal of the northwest and central regions, and Kirman's borax, manganese and marble are neglected to a great extent because of the difficulties and high cost of transportation. The turquoise mines of Nishapur have been worked from ancient times. Salt pits are abundant, and since 1903 large oil works have been erected in Western and Northern Persia. The total revenue to the government from mines is less than $100,000 per year.

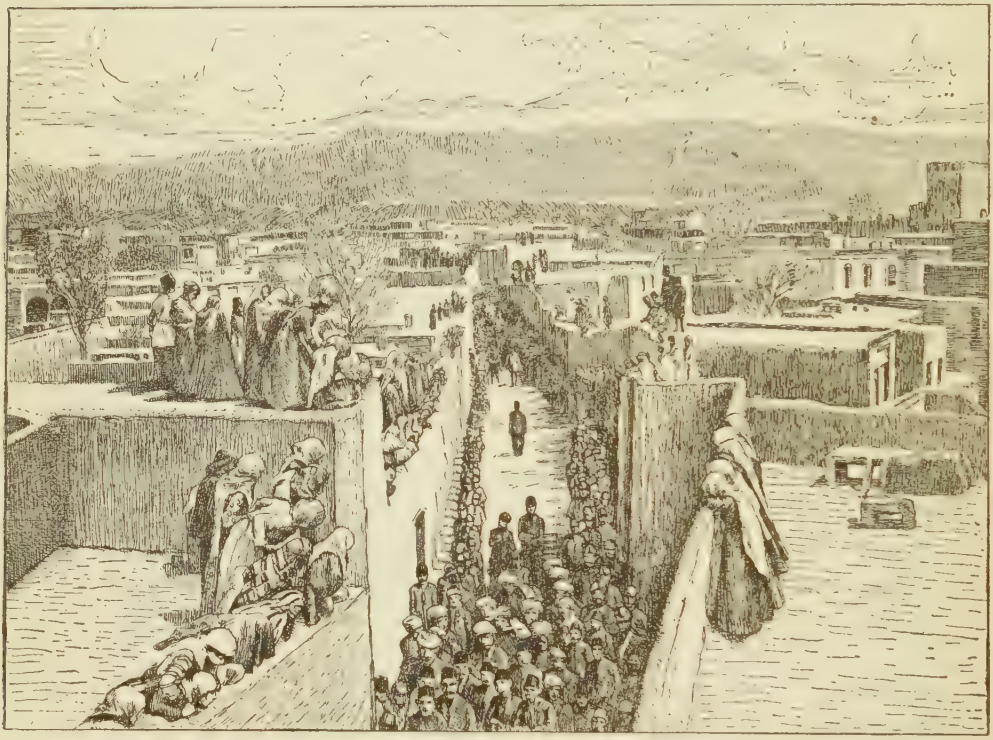
Transportation and Communication. Most of the trade routes of Persia are narrow camel paths crossing the rough mountainous country into Russia, Afghanistan and India. A high-

way for wheeled traffic, extending 217 miles from Resht, on the Caspian Sea, to Teheran, was built in 1899 by Russia, and another, ninety-one miles long, between Ispahan and Ahwaz, was constructed by the British in 1900. Since 1903 several paved roads between the chief cities have been opened and now travelers and mail are conveyed by cart, safely if not very rapidly.

Persia's only railroad, extending six miles between Teheran and one of its suburbs, was opened for traffic in July, 1888. Merchandise is carried by steamship to Russian ports across the Caspian and to English and Indian ports by way of the Persian Gulf. A telegraph system of about 6,500 miles of wire has been built by the British government, and since 1904 Persia has had telegraphic communication with India. Mails are carried regularly to and from 218 postoffices, and there is service twice weekly to and from Europe.

Cities. In the five principal cities of Persia, Teheran, the capital; Tabriz, the industrial center; Ispahan, Meshhed and Kirman, there is a population of only 680,000.

Physical Geography and Climate. The greater part of the country is an elevated table-land 3,000 to 5,000 feet high, broken by rough hills and enclosed on all sides but the east by a wall of bleak mountains—the Zagros on the west, the Kurdistan Mountains on the southwest and near the northwestern boundary the Elburz range, whose highest peak, Demavend, rises to 19,000 feet. The plains of the table-land are barren and the surrounding slopes have only a scanty covering of dwarf oak, cypress and walnut trees, but the valleys are made fertile by the melting mountain snows, and in these districts grow a great variety of timber and plants, and most of the crops of Central Europe can be raised there.



IN PERSIA'S CAPITAL CITY

The streets of Teheran are narrow and usually are crowded; the roofs of the houses are flat and are much used by the people as observation and sleeping quarters.

Dense, humid, malarial forests border the shores of the Caspian Sea, while along the Persian Gulf the table-land drops to a sandy plain, spotted with only a few patches of green oasis. In the eastern part of the country, divided by a narrow ridge of hills and a caravan route, lie Persia's two desert areas, the Great Salt Desert, a sea of rock salt covering 600 square miles and the Great Sand Desert.

In the central highlands there are a few streams flowing into inland lakes or losing themselves in the sand. The only rivers of any size are the Safid Rug, near the Persian Gulf, and the Karun, emptying into the Caspian Sea; these are navigable by light steamers only. Besides a number of small fresh-water lakes, Persia has three large but shallow salt lakes, Siestan, east of the Great Salt Desert, Urumiah in the northwest and Niriz in the south.

In summer one may experience many changes of temperature in Persia, traveling from the cold mountain peaks through the clear, dry heat of the table-lands to the sheltered, warm valleys below. The shores of the Caspian are tropically hot and humid, and along the Persian Gulf it is so hot and dry that even the scorching gulf winds give relief. In this region the heat lasts throughout the year, but the eastern plains are bleak during the winter months.

History and Government

Persia, next to Egypt and China, is the oldest country in the world. The northern part of the Iranian plateau was occupied by the Medes, who in 633 B. C. conquered the Persians and Assyrians. At the end of that century, however, Cyrus the Great of Persia conquered Medea and founded a mighty empire extending from the Oxus and Indus rivers to the Mediterranean. His son, Cambyses II, the Tyrant, added Tyre, Cyprus and Egypt to the empire, but Darius I in an attempt to extend the empire over Greece was defeated in one of the world's decisive battles at Marathon, in 490 B. C. This Grecian victory made it certain that the chief influence in civilizing Persia should be Western rather than Oriental.

Darius originated the Eastern system of satrap government, dividing the country into provinces, over each of which was placed a *satrap,* or governor, responsible to the king. Xerxes I, with an army and fleet surpassing any that had previously existed, was defeated by the Greeks at Salamis in 480 B. C. and at Mycale and Plataea in 479; these defeats shattered all hope of Persian supremacy in Greece and in Europe. The expense of this great army exhausted the kingdom and Persia's decadence began.

In 330 B. C., Alexander the Great conquered the country and it remained under Grecian rule for a century. The kingdom then passed successively into the hands of the Saracens and the Turks, and in 1251 it was conquered by the Mongols under Genghis Khan. A century later it was freed by the Persian leader Timur (which see), only to be divided among his sons and invaded by the Turkomans, after his death. In the sixteenth century Shah Abbas reunited the kingdom and prosperity continued for a hundred years, when civil war again disrupted the country.

In 1795 unity was restored by Agha Mohammed, of the Kadjar race, who added Georgia and Khorassan and founded the present dynasty. Later, coming into conflict with Russia on the Caucasian frontier and the Caspian Sea, Persia lost several districts along the Kur, and Georgia in 1801. In 1813 Daghestan, Shirvan and Bakin and the right of navigation on the Caspian Sea were ceded to Russia. In 1826 Russia was given Persian Armenia and an indemnity of $6,000,000. To pay this sum required heavy taxation, which led to an insurrection in 1829, when almost all of the Russian legation was murdered by a Persian mob. As a penalty, more concessions were exacted by Russia.

Internal dissatisfaction continued, and in 1834, assisted by Great Britain and Russia, Mohammed Shah obtained the crown, but he and his son, Nasr-ed-Din, came into conflict with England for encroaching upon Afghan territory; they were forced to sign a treaty in 1853, promising not to interfere in Herat, a commercial center of Afghanistan. In 1870 Russia recognized Persia's jurisdiction over Atrek. Nasr-ed-Din was assassinated in 1896 and his son succeeded him. In 1906 Parliamentary government was established, and in 1907 the throne was given to Ali Mirza.

By a Russian-English treaty in 1907, the country was divided into three spheres of influence: the Russian, extending over 305,000 square miles along the Russian frontier; the British sphere, covering 137,000 square miles on the western frontier; the remainder formed the neutral sphere, which Germany looks upon with envious eyes. England and Russia agreed to respect the integrity of Persia and to aid in the administration of finances, but how long this condition will continue is uncertain. This alliance between Russia and England was a diplomatic step to bring about the *Triple Entente* with France, to check the power of Germany.

In 1909 civil war broke out, the shah was deposed and exiled by the Nationalist party and

his son, Ahmed Mirza, a boy of eleven, was proclaimed ruler under the regency of a prominent Nationalist. In 1910, Mr. Shuster, an American, at the request of the government, was appointed by President Taft of the United States as Treasurer-General and supervisor of all Persian finances, but when he tried to enforce the collection of taxes he was opposed by the wealthy Russian residents. In November, 1911, Russia demanded his dismissal and the employment of a Treasurer-General selected by England and Russia. A Belgian was appointed, who resigned in 1914. In 1915 Swedish officers were placed in charge of the military police.

The regency was abolished in 1914 and the shah now rules, assisted by a premier and eight ministers of state. The shah's power is restricted by the Parliament of 120 members and the laws of the Mohammedan religion. He and the priests are the administrators of justice and Persia is noted for the cruelty of its punishments. The country is divided into thirty-three provinces, each under a governor-general responsible to the central government. Subprovinces, districts, parishes, cities and towns are governed by lieutenant-governors and mayors. E.B.P.

Consult Abbott's *History of Xerxes the Great;* Shedd's *Our Little Persian Cousin;* Buxton's *Stories of Persian Heroes.*

Related Subjects. The reader who is interested in Persia is referred to the following articles in these volumes:

CITIES

Ispahan	Susa
Meshhed	Tabriz
Persepolis	Teheran
Shiraz	

HISTORY

Alexander the Great	Greece, subtitle *History*
Cyrus the Great	Media
Darius, subhead	Triple Entente
Darius I	Xerxes

LEADING PRODUCTS

Carpets and Rugs	Opium

PHYSICAL FEATURES

Caspian Sea	Persian Gulf
Elburz	

UNCLASSIFIED

Iron	Mohammedanism

PERSIAN, *per'shan,* or *per'zhan,* **GULF,** an arm of the Indian Ocean separating Persia from Arabia, noted for its pearl fisheries, which are among the oldest in the world. The Strait of Ormuz connects it with the Gulf of Oman. Its area is about 90,000 square miles, its greatest length 520 miles, and its average breadth 180 miles. The Euphrates and Tigris rivers, which unite for the last 120 miles of their course to form the stream called Shat-el-Arab, pour their waters into the gulf. The principal ports are Abbas, Lingah, Bender, Bushire and Muhamrah. The River Karun, at the head of the gulf, has been opened to navigation as far as Ahwaz. The Bahrein Islands and Ormazd, Hormuz and Kishm are the principal islands in the gulf, the Bahrein group being particularly noted for their pearl fisheries. Iron, coal, salt and lead have also been found on the islands. A new tariff system, which came into force on February 14, 1903, under the commercial treaty between Persia and Russia, has affected the pearl trade by reason of the levying of a uniform duty of five per cent on all imports and exports. See colored map, ASIA, for location.

PERSIAN WARS, the name given to the struggle between the Persians and the Greeks which began in 500 B.C. and ended about 449 B.C. Some of the most famous battles in the history of the world occurred during this conflict—notably the battles of Marathon, Thermopylae, Salamis and Plataea; while among the famous men engaged in the struggle were Darius, Xerxes, Miltiades, Themistocles and Aristides. The causes of the wars and the progress of events in detail are given in the articles GREECE and PERSIA.

PERSIMMON, *per sim'un,* a group of trees belonging to the ebony family, two species of which are found in the temperate regions of North America. The common persimmon is distributed from Rhode Island to Florida and west to Kansas and Texas. It is an attractive tree of graceful appearance, not usually growing higher than fifty feet, and bears shiny green leaves, small, yellowish-green flowers and a deep yellow fruit an inch or more in diameter. This fruit is so bitter before it is ripe that a bite into one fairly "puckers" the mouth. Persimmons taste best after the frost has touched them. It is the tannin in them that makes them so astringent before they have ripened. The wood of the tree is very hard, tough and fine-grained, and is used in turnery. Persimmon trees grow best when planted from the seed, transplanting being a difficult process.

The other species, the *black persimmon,* grows in the western part of Texas as far south as the Gulf of Mexico. Its fruit is black and insipid and is valued chiefly for a black dye obtained from the juice. The wood, too, is black, sometimes with yellow markings, and is used to a limited extent for engravers' blocks. The

woods of both species are inferior to the ebonies of their tropical cousins.

The Japanese and Chinese cultivate varieties of persimmon that bear fruit larger than and much superior to the American. The Japanese persimmon, known as *Kaki,* which has been introduced into the Southern states by the Department of Agriculture, has been grafted upon the native tree with excellent results. In China the drying of persimmons for the market is a recent and rapidly-growing industry. A dried persimmon, both in appearance and in flavor, is much like a dried fig.

PERSON, *pur's'n.* The power a noun or a pronoun has to indicate, by either form or use, whether it refers to the speaker, the person spoken to, or the person or thing spoken of, is called *person.* If the word denotes the person speaking, it is said to be in the *first person;* if the person addressed, it is in the *second person;* if the person or object spoken about, it is in the *third person.*

Person in Pronouns. It is only the personal pronouns that make such distinction of grammatical person through a change in form, and it is this fact that accounts for their name. *I, we, myself* are pronouns of the first person; *thou, you, yourself* are of the second person; *he, she, it, they, himself, themselves,* and the like, are pronouns of the third person. See PRONOUN.

Person in Nouns. While a noun does not change in form to denote person, it is said to possess this property according to the way in which it is used, and we learn its person from the context.

It is said to be in the first person, for instance, if it is in apposition with a first personal pronoun; as, Can you believe such a thing of me, the *friend* of a lifetime? We *pupils* expect to raise the fund ourselves; now, therefore, I, *John Hamilton,* do hereby appoint and declare, etc.

A noun is in the second person if used in apposition with a second personal pronoun or independently by way of address; as, I call upon you, *John Hamilton,* to produce the proofs; sleep, *Ocean,* in the rocky bounds that circle thy domain.

A noun is in the third person if it simply denotes the person or thing spoken of; as, *John Hamilton* is my *uncle.* This is the most commonly used person, for every noun which is neither in apposition with a pronoun of the first or second person, nor used in direct address, classifies as a third-person noun, even though it may directly refer to a word denoting first or second person. In the following examples the italicized words are all of the third person: You are my *prisoner;* I understand, your *Highness;* I am *monarch* of all I survey.

Person in Verbs. Except in the case of the verb *to be,* it is only in the third person singular of the present tense that the person of the subject affects the form of the verb. That is, we say *I call* and *you call,* but *he calls, he leads,* or *he goes,* adding *s* or *es;* or, in solemn or poetic style, *he calleth, he leadeth, he goeth,* adding *eth.* After the little-used pronoun *thou,* the verb is inflected for person both in the present and past tenses of the indicative; as, *thou callest, thou hast, thou seest, thou calledst, thou hadst, thou sawest.*

Thus we see that it is only in the case of pronouns and verbs that person is of genuine importance so far as the actual form of the word is concerned. It is only for convenience in grammatical analysis that person is said to belong to nouns, since they are invariable in form, whether denoting the speaker, the person addressed, or the object or person concerning whom a statement is made. L.M.B.

PER'SONAL LIB'ERTY. The right of an individual to life, liberty and the pursuit of happiness is a foundation principle of every enlightened government. However, the right is subject to much abridgment, and the more complex society becomes the greater must be the limitations upon the liberties each person may enjoy. In a comparative wilderness a man may do practically whatever he wishes to do; no other people may exist whose rights may be tramped upon by anything he may do. In a densely-populated section restrictions by the hundred may be necessary to assure freedom and justice to all. As a matter of fact, the personal liberty of an individual extends only to the point where his actions infringe upon the rights of other people. When a man says, "I shall do what I please to do," he will do well to avoid entering the circle of another man's rights.

You may walk across the vacant property of your neighbor until he asks you not to do so; thereafter you are a trespasser. You may not always do what you please with your own property; for example, to burn an old building on your land may be the easiest means of ridding yourself of it, but if the fire would endanger the property of another—even a tree on his land—you must not do it. A railroad

man, pleading his personal liberty, may declare his right to drink liquor; his employers deny him that right, because patrons of their train service have a right to clear-brained, intelligent service.

When personal liberty passes the point where it has due regard for the rights of others it becomes *license*. It was this fact that caused Madame Roland to exclaim:

O liberty! liberty! how many crimes are committed in thy name!

The cry of personal liberty is frequently raised by opponents of prohibition laws, but the belief of the majority who have imposed such restraints is that the rights of the entire community are higher than the desires of the individual. The more one considers the "do as you please" principle the more evident it becomes that no man lives unto himself.

PERSONAL PROPERTY. All property is divided into two general classes, real property and personal property. Real property includes lands, including houses, trees and all other immovable objects thereon; personal property includes all other property. Live stock, farm implements, and crops that have been harvested are good examples of personal property; money, a merchant's goods and promissory notes are other examples. Real property cannot be transferred except by written contracts (see DEED), but personal property can be transferred by verbal contract. Buying a pair of shoes and paying money for them is a good example of transfer of personal property. In most states real property descends to the heirs on the death of the owner, but the personal property passes into the hands of the administrator of the estate, who sells it and divides the proceeds among the heirs, unless provision is made for its disposal by will. See CONTRACT; REAL ESTATE.

Consult Brantley's *Principles of the Law of Personal Property;* Pollock and Wright's *Possession.*

PERSONIFICATION, *per sahn i fi ka' shun,* a figure in rhetoric in which life is attributed to inanimate objects or to abstract notions. The Psalmist, in *Psalms* XIX, 1, used personification when he wrote, "The *heavens declare* the glory of God." In Thomas Gray's *Elegy* there are two examples of personification in the lines—

Fair *Science frowned* not on his humble birth,
And *Melancholy marked* him for her own.

Personification cannot always be distinguished from metaphor, which is founded on the resemblance of one thing to another. Such an expression as *the raging sea,* for example, could be considered as either metaphor or personification, for the sea is likened to a wild beast (implied comparison) and it is also endowed with life and action. See FIGURE OF SPEECH; METAPHOR.

PERSPECTIVE, *per spek' tiv,* the art of representing objects upon a plane surface, not as they are, but as they appear in space to the eye. The science of perspective is based upon certain fundamental facts. One of these is the apparent decrease in the size of an object as the distance between it and the observer increases. For example, a ship seems to grow smaller and smaller as it sails away from harbor, and the apparent decrease in size continues until it is lost to sight. Another basic fact is the apparent gradual decrease in size of objects of like dimension which stand at different distances from the observer. This is illustrated by Fig. 1, which shows a line of telegraph

FIG. 1

poles. To an observer, the first pole in a row seems the largest, and each of the others appears to be slightly smaller than the one ahead of it. Again, two parallel lines of poles or the two parallel rails of a railway track appear to converge as they recede from the eye, and finally to meet at the *vanishing point.* The appearance of objects is also affected by the position of the observer; that is, according to whether the objects are on a level with the eye, or are above or below it.

The rules for perspective can be easily understood by studying a cube, book, or other similar object (see Fig. 2). All of the lines (forming the edges) which have the same direction belong to a group, or *system;* each line is an *element* of the system. Each system has its own vanishing point, and all the lines of a system seem to converge toward the vanishing

point of the system. Any system which vanishes upward will have the vanishing point above the observer's eye; a system which vanishes downward will have the point below the eye; the vanishing point of a system of horizontal lines will be on a level with the eye, and that of a system of vertical lines will be

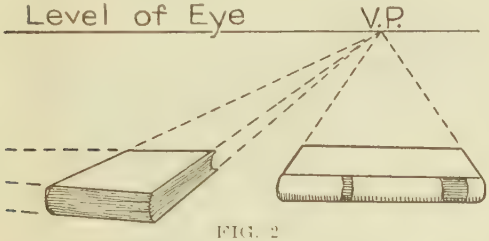


FIG. 2

vertically in line with the eye. There are similar rules for systems vanishing to the left and to the right. All horizontal lines have their vanishing points in the horizon.

Consult Lubschez's *Perspective: An Elementary Textbook;* Storey's *The Theory and Practice of Perspective.*

PERSPIRATION, *pur spi ra' shun,* a colorless liquid secreted by glands in the skin. Over ninety-nine per cent of it is water, but it contains also small quantities of urea, sodium chloride and other salts. Distributed over the body are about two and one-half million sweat glands, which, day and night, are discharging their contents upon the surface of the skin. That portion of the fluid which evaporates as fast as it is secreted is known as *insensible* perspiration; *sensible* perspiration is that which accumulates in drops.

The amount of perspiration discharged varies in healthy persons from twenty-five to seventy-one ounces a day, but exercise and a high temperature cause an increase in the amount secreted. In warm weather the evaporation of large quantities of perspiration helps keep the body cool. In health the flow of perspiration and rate of evaporation are maintained in that proportion needed to keep the temperature of the body at the normal point of 98° F. When one has a fever the skin is dry because the sweat glands are inactive. Profuse perspiration is sometimes brought about in treating kidney trouble, so that the sweat glands may help rid the blood of the excess of urea caused by failure of the kidneys to work properly. Evaporating sweat leaves a film on the skin, and the entire body should be bathed frequently to keep the pores open. See SKIN, THE.

PERTH, *purth,* the capital of Western Australia. It is situated on the north bank of the Swan River, twelve miles northeast of Fremantle, its port on the Indian Ocean. The Darling Range of mountains towers on the east, and the scenery in the vicinity has much charm. Perth increased rapidly in population during the last decade of the nineteenth century as a result of the discovery of gold. It has two cathedrals (Anglican and Roman Catholic), an observatory, the governor's palace and other notable public buildings, one of the three mints of the Australian Commonwealth, a park system and a race course. Population in 1921, within a ten-mile radius from the metropolitan center, 155,129.

PERTH, a town in Ontario, the county town of Lanark County, on the River Tay and the Canadian Pacific Railway, fifty-two miles southwest of Ottawa, 198 miles northeast of Toronto and 140 miles southwest of Montreal. Brockville is forty miles away; and Smiths Falls, thirteen miles. The River Tay is navigable only for canoes and small pleasure craft, but the Rideau Canal, which has been extended to Perth, has aided materially in the development of the town. Perth's principal industrial plants are foundries and machine shops, sash-and-door factories, felt, carpets, knitted goods, boots and shoes. There are extensive mica deposits in the vicinity. The town has a public library and a collegiate institute. Population in 1911, 3,588; in 1921 it was 3,790.

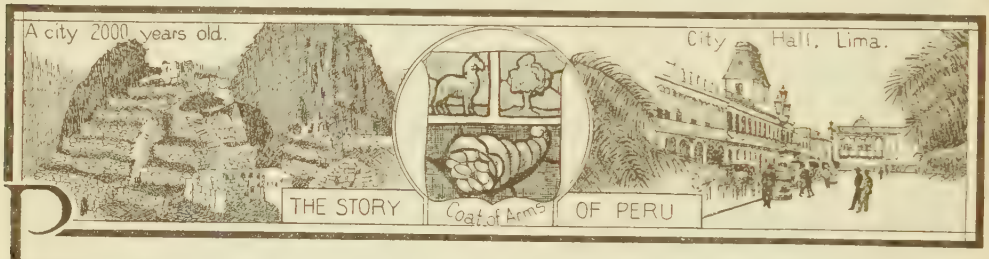
PERTH AM'BOY, N. J., a port of entry in Middlesex County, fifteen miles southwest of Newark, on Raritan Bay at the mouth of the Raritan River. It has an excellent harbor and is entered by the Lehigh Valley, the Pennsylvania, the Central of New Jersey and the Staten Island Rapid Transit railroads. Electric interurban lines extend to neighboring cities and to the beach resorts of the coast. The population, which in 1910 was 32,121, was 41,707 in 1920 (30 per cent gain). About forty per cent of the inhabitants, consisting principally of Hungarians and Slavs, are foreign born. The area of the city exceeds four square miles.

Perth Amboy has a fine water front on the bay and enjoys a large commerce, especially in coal. Trade is facilitated by the location here of the terminal coal docks of the Lehigh Valley Railroad. In the vicinity are found vast deposits of fire clay from which are manufactured terra cotta and bricks, and in the city are large shipyards and extensive copper

smelting and refining plants. The important products of manufacture are wire and cable, asphalt paving and roofing, cigars, chemicals, oil and cork, and the value of the entire annual output is over $73,000,000. The imports in 1913 were valued at $7,800,000 and the exports of the same year were worth $3,000,000. The city contains a Federal building, city hall, Y. M. C. A. building, Carnegie Library, public market, public hospital and a statue of Washington. A fine railroad bridge crosses the river at this point.

Settled in 1683, Perth Amboy became the capital of New Jersey province the following year, and remained the seat of government nearly all of the time the British were in possession. The last royal governor, William Franklin, was captured here in 1776. In 1718, Perth Amboy became a city. The first name was given in honor of the Earl of Perth, and the second was the original Indian name of the place.

PERTURBATIONS, *pur tur ba' shunz,* a term used in astronomy to describe certain variations in the motion of planets or comets. The orbit of the earth is subject to certain perturbations, or changes, due to the action of other planets. In its journey round the sun the earth does not follow an absolutely direct line of orbit but oscillates or sways in its motion several hundred miles above and below the true line of its orbit. This change, or perturbation, is due to the attraction of the moon. Other planets are also subject to perturbations, according to the influence on them of other heavenly bodies. See ASTRONOMY; PLANET; COMET.



PERU, a republic facing the Pacific Ocean for about a thousand miles, in the northwestern part of South America, is a land of romantic history, sublime scenery and economic importance. Its name at the time of the Spanish conquest, four centuries ago, was Tavantinsuyo. Happening to hear the word *pelu* spoken by a native, an officer assumed it to be the name of the country, and the rush of events caused the strange word, imperfectly transmitted, to spread rapidly and to take the permanent form *Peru.* The width of the Peruvian republic is about 700 miles; the area is about 722,461 square miles, equal to all of the Pacific coast states of the United States and nearly all of Nevada.

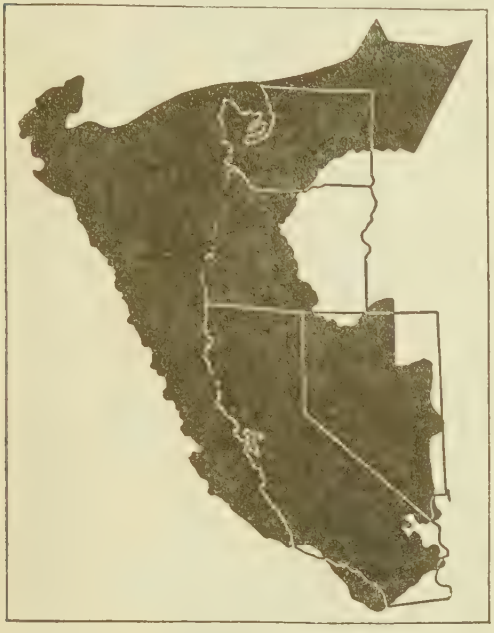
The People and Their Cities. The population of Peru is about four and one-half millions; about half of this number are of the native race, and the remainder are quite evenly divided between the whites of unmixed blood (chiefly Spanish) and the *mestizos,* or mixtures of European and native stocks. The whites represent the culture of Spain; and the Spanish language is spoken with a purity unequaled elsewhere in America. The descendants of the original Quichuas are industrious farm laborers or shepherds, mild in temper and not inclined to travel or to warfare. The mestizos are miners, freighters and drovers. Large numbers of negroes were brought to Peru by the early viceroys, and they mingled with the Quichuas. Their mixed descendants are called *sambos.*

Of the chief cities Lima, the "City of the Kings," founded by Pizarro as a really Spanish residence city, contains 176,467 people; Callao, the neighboring seaport, 52,843; Arequipa, in the southern mountains, 35,000; Cusco, the ancient capital of the Incas, 15,000; Ayacucho, in the same vicinity, 14,346; Conception, on the central plateau, 18,000; and Cerro de Pasco, in the same region, 12,000.

Physical Features and Climate. Peru is naturally divided into three distinct zones, or regions. The coast strip is a rainless region, where agriculture is impossible without extensive irrigation, for the winds (from the east) part with their moisture when passing the cold mountain tops. Between the mountains, which are in three ranges, are two rows of healthful plateaus of great fertility, in a climate that is always springlike. The third region is the eastern slope, from the mountain region to the valley of the Amazon; this is covered with thick

forests of trees which are valuable for their varied products. The forests, however, have not yet been fully exploited.

Mining and Agriculture. The annual production of minerals in Peru is worth $40,000,000. Copper is first in rank, and is followed by silver,



COMPARATIVE AREAS
Peru is much larger than all of the North American area shown. Nearly all of Texas could also be laid down within its boundaries.

crude coal oil, coal, gold and lead. About 440,000 pounds of silver is produced in a year. Cerro de Pasco is in a famous mining region. A million barrels of oil are produced annually in the region near Lake Titicaca. Vanadium was found in 1904, and Peru now supplies about seventy per cent of the world's output of that metal. Guano, for fertilizing, is a source of wealth, and sulphur is exported in considerable and increasing quantities.

The leading agricultural products of Peru are sugar, cotton and rice, and irrigation is largely employed in raising them. Coffee, tobacco, Indian corn and ramie are cultivated in the higher regions.

Commerce. Trade is carried on chiefly with the United Kingdom, Germany, the United States, France, Chile, Italy, Belgium and Australia. Peru's total exports for 1915 amounted to 9,137,780 libras (the libra being equal to the British pound sterling, or to $4.866 United States money); the imports, to 6,088,776 libras, which facts tell of prosperity. In other words, the exports equaled $44,409,610 and the imports $29,591,451. Peru has fewer than 2,000 miles of railway, and much is to be done in railway construction; but the seaports are generally supplied at least with short lines into the interior. There is much transportation by pack mules.

LOCATION MAP
Showing Peru's position in South America and the relative portion of the continent occupied by the country.

Commercial Possibilities. The United States in 1913, for the first time, led all other individual nations in supplying Peruvian imports, doubling the amount of 1909. American trade is growing very rapidly, and will continue to grow with the greater accessibility brought about by the Panama Canal. Before that waterway was built, Peru was cut off from Eastern America. The opportunities for trade and investment in Peru are almost without limit. The usages of a society so refined and cultured as that of the Spanish element in Peru may seem exacting, but they should not be carelessly violated or ignored in business relations. Cultivation of the social side of life is indispensable to business success.

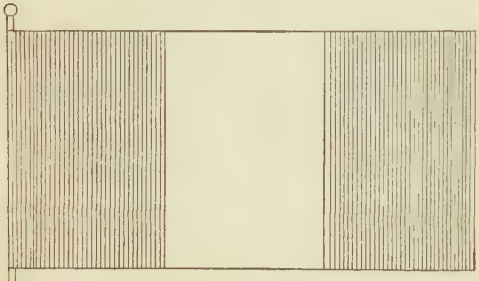
Education. Elementary education is free and compulsory. There are twenty-seven colleges; the University of San Marcos is the oldest in America. There are various high schools and institutions of applied science. H.M.S.

Government and History

Government. Until the adoption of the present constitution in 1860 there were many changes and much confusion in the government. The republic is centralized, having a congress of two houses, the Senate and the House of Deputies. The President is chosen for four years, and is ineligible for the term next succeeding. The Congress meets annually. There are two Vice-Presidents. Municipal administrative officials are appointive.

History. The vast empire of the Incas, after an existence of about three centuries, was overthrown by the Spaniards, led by Pizarro, with unspeakable treachery and cruelty. This ruthless conqueror was not typical of Spanish culture or character, for once he had been a nameless outcast infant whom tradition says a sow had suckled with her pigs in the streets of Trixillo, Spain. He was a combination of greedy ambition and brutal ferocity. In 1532, with "a handful of men, without food, without clothing, almost without arms, without knowledge of the land to which they were bound, without a vessel to transport them," he encamped on the island of Gallo, off the Peruvian coast, planning there the overthrow of the great, prosperous, peaceful land of the Incas.

His men, unable to dissuade him or to reach the Spanish governor at Panama with their protest, resorted to strategy. They sent back on the governor's ship, as a present to the governor's wife, a large ball of coarse yarn which



THE FLAG OF PERU
Vertical lines are red; plain surface, white.

they manufactured in some way, and in the heart of which was concealed a note telling of their distress. The quick-witted lady unwound the yarn and read the message; then induced the governor to recall them. The recall was ignored. Pizarro took the governor's ships and landed on the coast. In one encounter with the natives, his party was saved by the accident of a horseman's falling from his steed; for the natives had supposed man and animal together to be but a single being, and, stunned by amazement at seeing it thus separated into parts, they permitted the invaders to escape at the time. Pizarro seized the Inca, or sovereign, and eventually put him to death.

Having need to send his horsemen to Xanca, to capture the Inca's chief aid, Pizarro found it absolutely necessary for his horses to be shod. Iron was unknown, and the resourceful leader had them shod with solid silver. Gold was plentiful and was greedily seized by the buc-

Outline and Questions on Peru

I. Size and Position

(1) Area
  (a) Actual
  (b) Comparative
(2) Location in continent
(3) Bordering countries

II. Physical Features and Climate

(1) Three topographic zones
  (a) The rainless coast strip
  (b) The fertile plateaus
  (c) The eastern slope
(2) Climate

III. Industries and Communication

(1) Agriculture
  (a) Chief crops
(2) Mining
  (a) Copper
  (b) Vanadium
  (c) Other minerals
(3) Railways
(4) Transportation by pack mules
(5) Commerce

IV. The People

(1) Population
(2) Races
  (a) Natives
  (b) Whites
  (c) Mestizos
(3) Education
(4) Cities
(5) Government
  (a) Republican form

V. History

(1) The civilization of the Incas
(2) The Spanish conquest
(3) Independence achieved

Questions

Who were the Incas? Describe their civilization and give some details of the conquest by which it was overthrown.

How did the country receive its name?

How many of the South American republics are larger than Peru? How many have a larger population?

Are all these larger countries more populous?

What are *mestizos?*

How does the Spanish of the cultured Peruvians compare with that of the inhabitants of other countries of the western hemisphere?

Who are the *sambos?*

What is the "City of Kings," and who founded it?

Why is the westernmost part of Peru practically rainless?

What is the *libra,* and how much is it worth?

From what nation has Peru in recent years received most of its imports?

When was an important message sent in a ball of yarn?

When and why did the fall of a rider from his horse save an army from destruction?

Who shod his horses with solid silver?

Tell the origin of the proverbial expression "to gamble away the sun before the sunrise."

In what way were knotted cords made an aid to memory?

caneers. To one soldier fell, as a spoil, the immense gold image of the sun, with rays or streamers, on the wall of a great temple. This was a large fortune, but in the madness of the hour its new possessor gambled it away in a single night, thus giving rise to the Spanish proverbial expression, "to gamble away the sun before the sunrise." When the Inca empire was overthrown, the people were reduced to slavery to satisfy the conquerors' thirst for gold.

W. H. Prescott's *Conquest of Peru,* an American classic, everywhere familiar, relates the story of the marvelous conquest in interesting detail.

The history and all the learning of the Inca population were preserved among that strange people, not by picture writing (as in Mexico), but by memory, aided by a strange system of *quipus,* or cords, variously knotted and colored. Every knot, every color, meant something to be remembered; and the *quipu* system of recording events was more or less efficient for meeting all the needs of that peculiar civilization.

Cuzco, the capital of the Incas, has been rendered somewhat familiar as a subject in many lands through dramas portraying the conquest. A classic drama bearing the title *Ollanta,* written by a Spaniard in the seventeenth century and translated into English by Sir Clements R. Markham, came into world-wide fame in 1837. It presents a vivid picture of the life of the Quichuas, the Inca's people, in centuries long past; and being based on facts carefully preserved by legend it lends interest to the ancient palace (visited by tourists to-day) which supplied some of its heroic scenes. Ollanta, the mountain chieftain, and Cusi, the Inca's daughter, are the hero and heroine.

In the palace at Lima, the modern capital, is an unbroken line of portraits of all the forty-four Spanish rulers of Peru from Pizarro (1533) to Pezuello (1824), with whom Spanish rule ended. The line of viceroys included great and good men. Gasca (in the middle part of the sixteenth century), who abolished slavery, has been compared to George Washington; and to the historian Prescott he seems to have been raised up by Providence for his noble work.

Some women have been conspicuous in Peruvian history. The Señora Maria de Escobar, of Pizarro's native city of Trixillo, brought from Spain an abundance of wheat for seed, and taught the natives to use this cereal. She also led her friends to establish real homes of culture, rather than camps of adventure. The Condessa (countess) of Chinchon, wife of one of the sixteenth century viceroys, being cured of a fever by a faithful native when her own eminent physician despaired of her life, devoted herself to spreading abroad through the world the blessing of the native medicine used in her case, which was the bark of a tree called *quinoquino.* Scientists have applied her name (somewhat altered) to the *cinchona* tree, and the medicine is called *quina,* or *quinine.*

The good work of faithful priests in moderating the rigors of rulers and in teaching the people useful arts, investigating plant and animal life, preserving the history and promoting every good word and work, is lauded by Prescott, and presents a model of Christian activity outside of spiritual labors.

The Spanish power in Peru, described above, was finally overthrown in the Battle of Ayacucho, December 9, 1824, in which General Sucre, an aid of Bolivar, commanded the patriots. San Martín (of Argentina) and the British admiral Lord Cochrane, in command of the Chilean fleet, had rendered notable aid two years before. H.M.S.

Consult Wright's *Old and New Peru;* Martin's *Peru of the Twentieth Century.*

Related Subjects. The reader who is interested in Peru is referred to the following articles in these volumes:

CITIES

Arequipa	Cuzco
Callao	Lima

UNCLASSIFIED

Andes	Quinine
Guano	Titicaca, Lake
Inca	Vanadium
Pizarro, Francisco	

PERU, IND., the county seat of Miami County and the commercial center for a large agricultural section in the northern part of the state. The city is situated about midway between the geographical center and the northern border of Indiana, and is on the Wabash River, sixteen miles east of Logansport and seventy-four miles north of Indianapolis. It has the service of the Wabash, the Lake Erie & Western and the Chesapeake & Ohio railways, and interurban lines operate to cities north, south, east and west. The people are chiefly engaged in making foundry and machine-shop products, automobiles and gas engines; the shops of the railroads entering the city are located here, and there are bagging mills, carbon works and furniture and wagon factories. The Wabash Railway has a hospital in the city for its employees. Peru was settled in 1827, was incorporated in 1834 and is governed under a charter of 1868.

in 1910 the population was 10,910; in 1920 it was 12,561 (15 per cent gain). The area of the city is over two and one-half square miles.

PERUGINO, *pa roo je'no* (1446-1524), a celebrated Italian painter and representative master of the Umbrian school. He was one of the first of the early Italians to adopt with success the Flemish method of oil painting, and none of his pupils, with the exception of Raphael, attained the deep purity of coloring which is characteristic of his art. His real name was Pietro Vannucci. He was born at Citta della Pieve in Umbria, and accomplished most of his work in the neighboring city of Perugia, being thereafter called Il Perugino. In 1483 Pope Sixtus IV called him to Rome, where he was employed with other famous artists in decorating the Sistine Chapel with frescoes. His fresco *Christ Giving the Keys to Peter* is the best of those still visible, three of the others having been destroyed to give space to Michelangelo's *Last Judgment.* Other specimens of his work are preserved in Perugia, Rome, Bologna and Florence. His altarpiece in the National Gallery, London, was originally painted for the Certosa Convent at Pavia. Many other European galleries treasure specimens of his art.

PERU'VIAN BARK, the bark from several trees of the cinchona family, valued for the quinine it contains. For a description of the trees and the drug, see the article Cinchona.

PESETA, *pa say'tah,* the monetary unit of Spain. It is worth 19.3 cents of United States money, having the same value as the French *franc* or the Italian *lira.* One peseta is worth 100 centesimos. Gold coins are made having the value of five, ten, twenty and twenty-five pesetas, and silver coins having the value of one and of five pesetas. The silver one-peseta piece has on one side the head of the king and on the other the coat-of-arms of Spain. The word is the diminutive of *peso,* the name of a large gold or silver coin once used in Spain and its colonies; *peso* comes from *pensum,* the Latin for *weight.* Consult the article Denominate Numbers for comparative *Table of Equivalent Values.*

PESO, *pa'so,* originally, the name of the old Spanish dollar, called *peso de oro* or *peso de plata,* according as it was coined of gold or of silver. In Spain the peso is no longer the standard of value, but it retains its importance as a monetary unit in the Spanish-American countries. Thus, in most of the states of South and Central America, as well as in Mexico, the silver peso, or dollar, is still the standard, though varying considerably in value. The peso of the Central American states, for instance, is worth only about $0.39 in United States money, and that of Mexico $0.498, while that of Uruguay is valued at $1.034 in United States money. In the Philippine Islands before they were acquired by the United States, the monetary unit was the peso, worth $0.50.

PESSIMISM, *pes'i miz'm,* from a Latin word *pessimus,* meaning *worst,* is the philosophy which holds that there is more bad than good in the world and more pain than comfort. It is the opposite of *optimism,* or the belief that this is the best possible world. Strictly speaking, pessimism is more a state of mind than a philosophy. There are many grades and variations of pessimists, including the person who feels that the hereafter is very uncertain and determines to enjoy all of the present; and those who think that the world is steadily decaying. There are others who feel that man himself is as bad as possible and beyond redemption; and still others who hold that bad as man is, he may become immaculate in the hereafter. Arthur Schopenhauer, a German philosopher, is the most famous modern pessimist. See Optimism.

Consult Sully's *Pessimism: A History and Criticism;* Schopenhauer's (translated by Saunders) *Studies in Pessimism.*

PESTALOZZI, *pes ta lot'se,* Johann Heinrich (1746-1827), one of the world's greatest educational reformers, was born at Zurich, Switzerland. His father died when Johann was five years of age and he was brought up by his mother and a devoted servant, who shielded him from contact with other boys and society in general. He was a shy, delicate and awkward boy, and his early training tended to emphasize these characteristics. Later he passed through the Latin school at Zurich and the public college. Pestalozzi possessed an ardent love for his country and the people, and when a youth he resolved to do all he could to relieve the poor. It was in his attempts to carry out this resolution that his work as an educational reformer began.

PESTALOZZI

He first decided to be a minister, but gave up the ministry to follow the law, because he thought that he could render the people greater service by defending them in the courts. His health became broken by hard study, and he settled on a farm. However, because of his brilliant and erratic gifts he was not adapted to the life of a farmer, and after seven years of struggle he found himself heavily in debt.

Early Attempts. Pestalozzi converted his farm into an industrial school at Neuhof for the poor children of the neighborhood, that they might be enabled to earn their living. He taught all his pupils reading, writing and arithmetic. The boys received instruction in farming, and the girls in gardening, housekeeping and sewing. Religious education was also a strong feature of the school. The pupils were to earn their support and pay something towards the expenses of the school by cotton spinning, but Pestalozzi's lack of business ability caused the enterprise to fail.

At about the time that the school at Neuhof failed the battle of Stanz occurred, and a large number of the inhabitants were massacred. A poorhouse had to be provided for scores of orphans, and Pestalozzi was called to take charge of it. Here under the most unfavorable conditions he achieved successes that delighted and amazed those who visited the institution. Within six months the school was closed because the building was wanted for a military hospital.

Burgdorf and Yverdun. In 1800 Pestalozzi and his associate, Krusi, opened at the Castle of Burgdorf a college for the training of teachers. A secondary school, an elementary school and an orphan asylum were included in their plans and connected with the college. The staff of instructors was increased by a number of men who did much to strengthen the organization and systematize the management. This school soon became the center of educational experiments, investigation and training hitherto unknown. Here Pestalozzi worked and taught for four years, when the school was removed to Yverdun, where it continued until 1825. The first five years of this period were characterized by brilliant success, and the school won a reputation that was worldwide. To it came statesmen and teachers from all the countries of Europe and from America to learn the methods and ideas of the great educator. Among them was Henry Barnard, who became the first United States Commissioner of Education. Dissensions among the faculty, which Pestalozzi was unable to control, caused the school to decline and finally to close. Two years later the founder died, disappointed and poverty-stricken.

Pestalozzi's Influence. The value of Pestalozzi's work as an educator consists in the principles he set forth and tried to put into practice. He believed that the principles of education were to be found in human nature, and that the child's physical, intellectual and moral capacities should be trained. He advocated industrial training along with training in subjects commonly taught in the schools, and placed great stress upon sense training. Objects, the study of nature and lessons from the pupil's daily experiences were in his estimation of equal or greater value as material than lessons found in books. His method was that of discovery on the part of the child, and led to an all-round development that previous methods of instruction had not reached.

His influence spread rapidly over Europe, affecting profoundly the schools of Germany, which were regenerated and placed on a foundation that was the beginning of their present efficiency. It also quickly extended to America, where his system was introduced by William McClure. The results were seen in the improvement of methods of teaching and especially in the establishing of normal schools and in a greater public interest in education.

Writings. Pestalozzi's writings were upon political and educational topics. His most important educational works are *The Evening Hours of a Hermit; Leonard and Gertrude* and *How Gertrude Teaches Her Children.*

Consult De Guimps's *Pestalozzi, His Life and Work;* Green's *Life and Work of Pestalozzi.*

PÉTAIN, Henri Philippe (1856-), one of the greatest military leaders of the War of the Nations, who was made commander-in-chief of the French armies operating on the Western front, in May, 1917. Marshal Pétain had attained only the rank of a colonel when the war broke out, and was then on the retired list. Though he had gained no fame as a soldier, his military abilities were known to Joffre, who called him at once to take charge of a brigade in the first army corps. This brigade so distinguished itself in the retreat from Charleroi to the Marne that just before the Battle of the Marne its commander was promoted to be a general of division (September, 1914).

He was soon after made commander of an entire army corps, and gave such a good account of himself in the Artois and Champagne cam-

paigns that he was made chief commander of the armies defending Verdun in the spring of 1916. When Pétain held his ground here, in one of the greatest assaults in all history, the French people knew that the war had brought to the front a military genius of first rank. General Pétain was made chief-of-staff in April, 1917, and about two weeks later succeeded to the supreme command on the western line of battle. In 1918, when the allied cause was nearly hopeless, he was succeeded by Foch, who became a Marshal of France. It is said that in his preparation for military leadership Pétain studied over 500 tactical and strategical encounters. In 1918 his grateful country made him a Marshal of France, with Foch and Joffre.

MARSHAL PÉTAIN

Next to Marshals Foch and Joffre he proved to be France's ablest military commander in the War of the Nations.

PE'TER, or **SI'MON PETER,** the most prominent of the twelve disciples of Jesus. Together with James and John, he was intrusted with his Master's most intimate confidence. He was enthusiastic in his loyalty, yet at times failed to carry out his good intentions. It was Peter who made the great confession, "Thou art the Christ, the Son of the living God," and it was also Peter who declared with oaths, on the eve of the Crucifixion, "I know not the man." Reinstated in his place of leadership by Jesus, who had seen from the beginning the real strength beneath Peter's inconstancy, he became the firebrand of the early Church (*Acts* I-XII), preaching with power, performing miracles of healing, meeting fearlessly the charges of the Sanhedrin and enduring imprisonment with joy. Peter made a missionary journey which lasted about eight years. He was the author of the *First Epistle of Peter,* and, according to most authorities, of the *Second Epistle of Peter.* He was probably martyred at Rome at the time of the persecution by Nero.

PETER I, Alexeyevitch (1672-1725), known as Peter the Great, was the most notable emperor of Russia and recognized as well as one of the greatest sovereigns of modern times. To him, more than to any other one person, the growth and greatness of Russia were due. He was the son of the Czar Alexius Mikhailovitch by his second wife, and his half-brothers Feodor and Ivan stood between him and the throne. Feodor, who died in 1682, designated Peter as his successor, but Sophia, sister of Feodor, desired to have her brother crowned, because he was weak-minded and would permit her to rule. At length both brothers were crowned, but in 1689 Peter forced Sophia to resign the government and enter a convent, while he himself became in reality sole ruler, though associating Ivan's name with his own until Ivan's death in 1696.

PETER THE GREAT

The most notable of all of Russia's sovereigns and the greatest of the Romanoffs, which dynasty ruled the country from 1613 to 1917.

Sought Education and Efficiency. Meanwhile, Peter saw clearly what he wished to accomplish for Russia and what obstacles stood in his way. His education had been of the most casual sort, and any subject of which he wished to make use in his government he had to learn from its foundation. No difficulties ever daunted him, however, in his task of making Russia a country worthy of recognition by other nations. If he was to meet the western states of Europe on an equal footing he must have an organized fighting force, and the reorganization of the army on the German model was the first reform which he set in motion. Then, too, he desired for Russia a navy, and an outlet for that navy on ice-free waters. In pursuance of this design he took Azov from the Turks in 1696, thus gaining a port on the Black Sea. He brought artisans, engineers and soldiers from other countries, but they could not teach him all he wished to know, and in 1697 he set out on a tour of Europe, tarrying wherever he could learn anything which he felt might be useful to him. Gunnery, shipbuilding, anatomy—he acquired more than a superficial knowledge of these and many other subjects; nor was he above working as a carpenter in the shipyards in Holland that his knowledge might be of the most practical kind. Before

he had completed his travels he was recalled to Russia by a rising of the imperial guard, which he put down with great severity, suppressing the organization entirely.

No subject was too trivial to feel the effects of Peter's reforming energy. He ordered his subjects to adopt European dress instead of the flowing Oriental costumes, and he taxed beards and mustaches to discourage the custom of wearing them. But he did not confine himself to such externals; he encouraged foreign commerce; reorganized the Church, making himself its head; reformed the calendar and released women from their almost Asiatic seclusion. Nor did he cease his struggle for open ports.

National Projects. To secure access to the Baltic Sea he entered upon a contest with Sweden which lasted from 1700 to 1721. In his first battles with Charles XII he was utterly defeated, but he expected such an outcome, and persisted until, in 1709, he gained a complete victory at Poltava. Two years later, however, in a war with the Turks which Charles XII had instigated, he suffered reverses, and lost Azov. Meanwhile, in 1703, Peter had begun the construction of his new capital, Saint Petersburg, called since 1914 Petrograd, on territory which he had wrested from the Swedes, and in 1712 transferred his government from Moscow to that city, to the great indignation of the old nationalist party. Peace with the Swedes was not signed until 1721, but by it Russia gained Livonia, Esthonia, Ingermauland, Karelia and part of Finland. In the same year Peter was proclaimed emperor of all Russia and "Father of the Fatherland." He was thus really the first of the czars.

His Character. That Peter's intense desire for civilization did not free him from barbarous instincts and passions is shown by his cruelty toward anyone who incurred his disfavor. Because he thought that his own son was encouraging the reactionary party, Peter had him condemned to death, and though he afterward pardoned him the prince died from the effects of the tortures which had been inflicted upon him. A few years after marriage he drove his wife from him because the two differed on policies of state as well as on personal matters; she displayed autocratic and reactionary tendencies which threatened to nullify some of the reforms he instituted. In 1792 he married his mistress, Catharine, who succeeded him upon his death, in 1725, as Catharine I; she had been crowned in the preceding year, that her succession might be assured.

Peter's rages were terrific, but he never allowed them to lead him into courses that would injure his nation. Unlike other rulers who have attempted reforms in Russia, Peter did not attempt to force upon his barbarous or half-civilized people institutions or principles which were beyond their comprehension. A.MC C.

In addition to references above, see RUSSIA, subtitle *History of Russia.* Consult Barrows' *Life of Peter the Great;* Abbott's *History of Peter the Great of Russia.*

PETER I, called KARAGEORGEVITCH (1846-1921), king of Serbia, born in Belgrade. His father, Alexander, was forced to abdicate in 1858 and he took his boy to Hungary. There Peter studied, and later he was graduated from the French military school of Saint-Cyr. While serving as an officer in the French army during the Franco-German War he was captured three times by the Germans, but each time escaped. Much through his influence the Balkans were encouraged in their revolt, which led in 1877 to the Russo-Turkish War and terminated in independence for Serbia. Peter became connected with the rulers of Russia and Italy through his marriage in 1883 to Princess Zorka, daughter of Prince Nicholas of Montenegro. They lived quietly together at Cettinje, and after Zorka's death Peter removed to Geneva. In 1903, when King Alexander and Queen Draga of Serbia were assassinated, Peter was chosen king by the element that had brought about the royal murders.

In 1915 the German invasion and occupation of Serbia drove Peter to Paris. Alexander succeeded him as king.

PETERBOROUGH, *pe'ter bur o,* a city in Ontario, the county town of Peterborough County, the center of a river and lake district which is very popular among sportsmen, and one of the largest centers of electrical development in Canada. It is situated on both banks of the Otonabee River, on the Trent Canal, and on the Canadian Pacific and Grand Trunk railways, seventy-six miles northeast of Toronto. Peterborough is noted among other things for the great hydraulic lift lock on the Trent Canal, the largest lock of its kind in the world. The city is the seat of a Roman Catholic bishop, and has a fine cathedral. It has a provincial normal school, collegiate institute, fine municipal buildings and several public parks. The waterworks are owned by the city. Population in 1911, 18,360; in 1921 it was 19,477, making it the twelfth city in size in Ontario.

The development of electrical power at Peterborough has coincided naturally with a development of manufacturing. Between 1900 and 1910 the output of manufactured goods increased from less than $4,000,000 to $11,000,000, and in 1916 local estimates placed the annual total at more than $20,000,000. Gold, silver, lead, mica and iron are found near by, and the last three are used in local industries. Of the many manufactures the following are most important: lumber, flour, packed meats, agricultural implements, dairy machinery, steel sashes, electrical machinery and supplies, shovels, harness, carpets, clothing, yarn, canoes and cereals.

PETERSBURG, *pe'terz burg,* SIEGE OF, a famous siege that marked the end of the War of Secession. It began in June, 1864, and ended in April, 1865, and was the last chapter in the campaign against Richmond, Va., the capital of the Confederacy. After the repulse at Cold Harbor on June 3, 1864, Grant transferred his army to Petersburg with the intention of capturing the city and thus compelling Lee to evacuate Richmond, twenty-one miles distant. An assault made by General Butler on the fifteenth of June failed, and other assaults on three following days were also unsuccessful. In July a mine was run under the Confederate fort by General Burnside, who planned to lead a charge through the gap in the earth made by the explosion, but inefficient leadership caused the Federals to be trapped, and a loss of nearly 4,000 resulted.

The Confederacy held out seven months longer. As the siege drew near its close General Sheridan was sent by Grant to destroy the railroad which carried supplies to Richmond, and Lee in turn sent forces to meet him, but the Confederates were defeated at the Battle of Five Forks, on April 1, 1865. On the following day Grant ordered a final assault on Petersburg, which fell after a gallant defense. On April 3 the Federals drove Lee into hopeless retreat and marched into Richmond, and on April 9, 1865, Grant and Lee met at Appomattox Court House and arranged terms of surrender.

PETERSBURG, VA., a port of entry and a city of historical interest, situated in the southeastern part of the state at the head of navigation on the Appomattox River, about ten miles from its mouth, and on the upper Appomattox Canal. Formerly it was included in the county of Dinwiddie, but it is now independent of county authority, being located at the point where Chesterfield, Dinwiddie and Prince George counties meet. Richmond, the state capital, is twenty-two miles north, by rail. Transportation is provided by the Norfolk & Western, Seaboard Air Line and Atlantic Coast Line railways and by an interurban electric line which communicates with cities and towns north. In 1910 the population was 24,127; by 1916 it had increased to 25,582 (Federal estimate). At City Point, nine miles northeast, E. I. du Pont and de Nemours & Company established the Hopewell Munitions Works after the outbreak of the War of the Nations; after the war the plant was turned to other purposes. Population, 1920, 31,012.

Petersburg is located in a region well adapted to the growing of tobacco, peanuts and lumber, and these products, with fruits and vegetables, are the chief articles of an extensive trade. The falls of the Appomattox River immediately above the city increase the facilities for manufacturing, which is here represented by cotton, tobacco, clothing, trunk, silk and knit-goods factories, and lumber mills. The State Central Hospital for the Insane, harboring about 1,000 colored patients, is in Petersburg. The Virginia Normal and Industrial Institute for both sexes, the Southern Female College, the Y. M. C. A. and the Benevolent Mechanics Association, with a museum and library, are important educational institutions. Noteworthy buildings are the Masonic Temple, Red Men's and Odd Fellows' buildings and the city government buildings. There are two recreation parks.

In 1676 the site on which Petersburg is built was a village of the Appomattox Indians. White people made a settlement here in 1733, which was incorporated as a town in 1748 and chartered as a city in 1850. Petersburg was conspicuous in the War of the Revolution and the War of 1812, and during the War of Secession it was the scene of much fighting, being a depot for military supplies from the South. The ten months' siege of Petersburg, which lasted from June, 1864, until April, 1865, was an important part of General Grant's campaign against Richmond (see PETERSBURG, SIEGE OF).

End of Volume Seven

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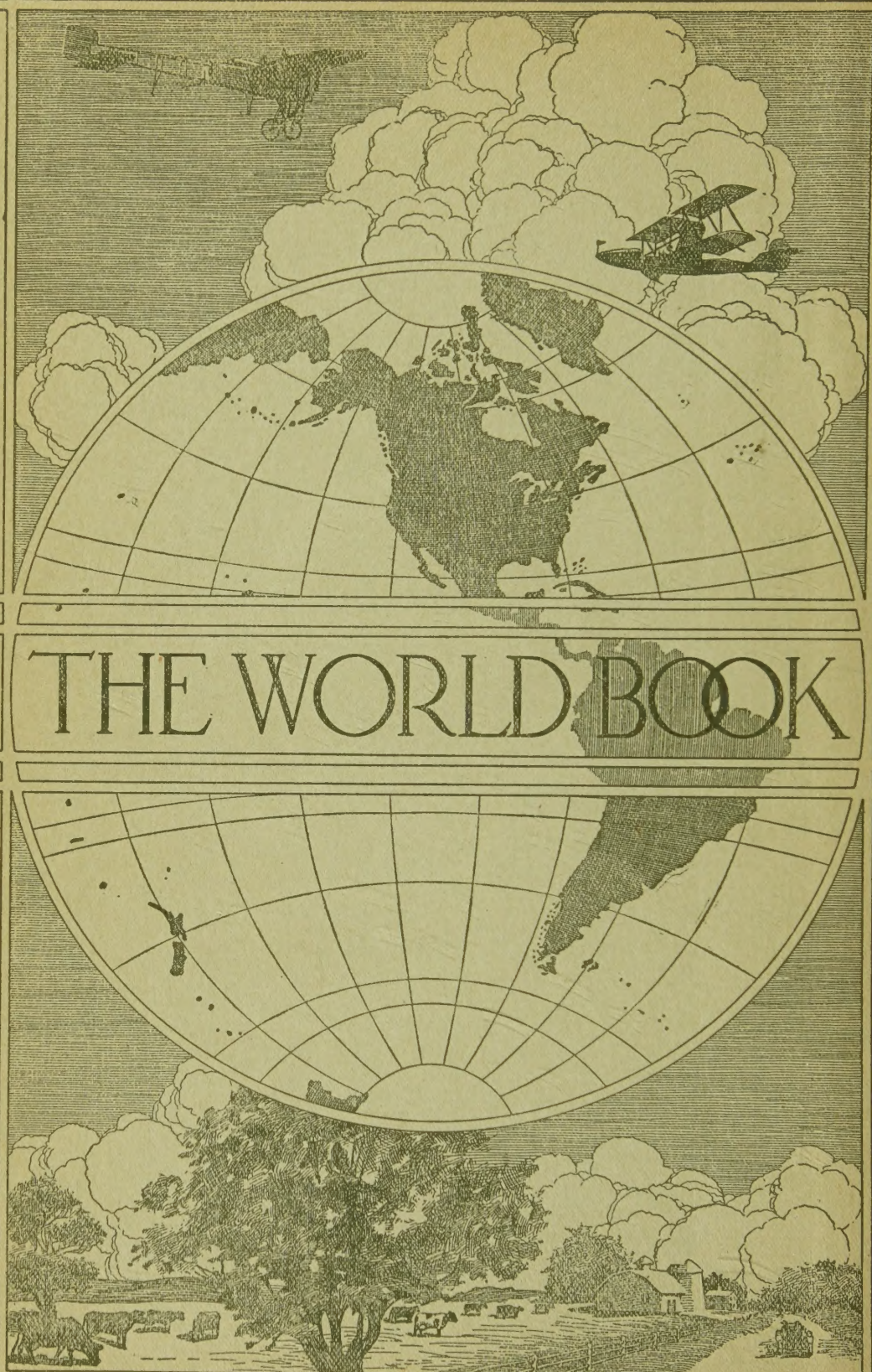
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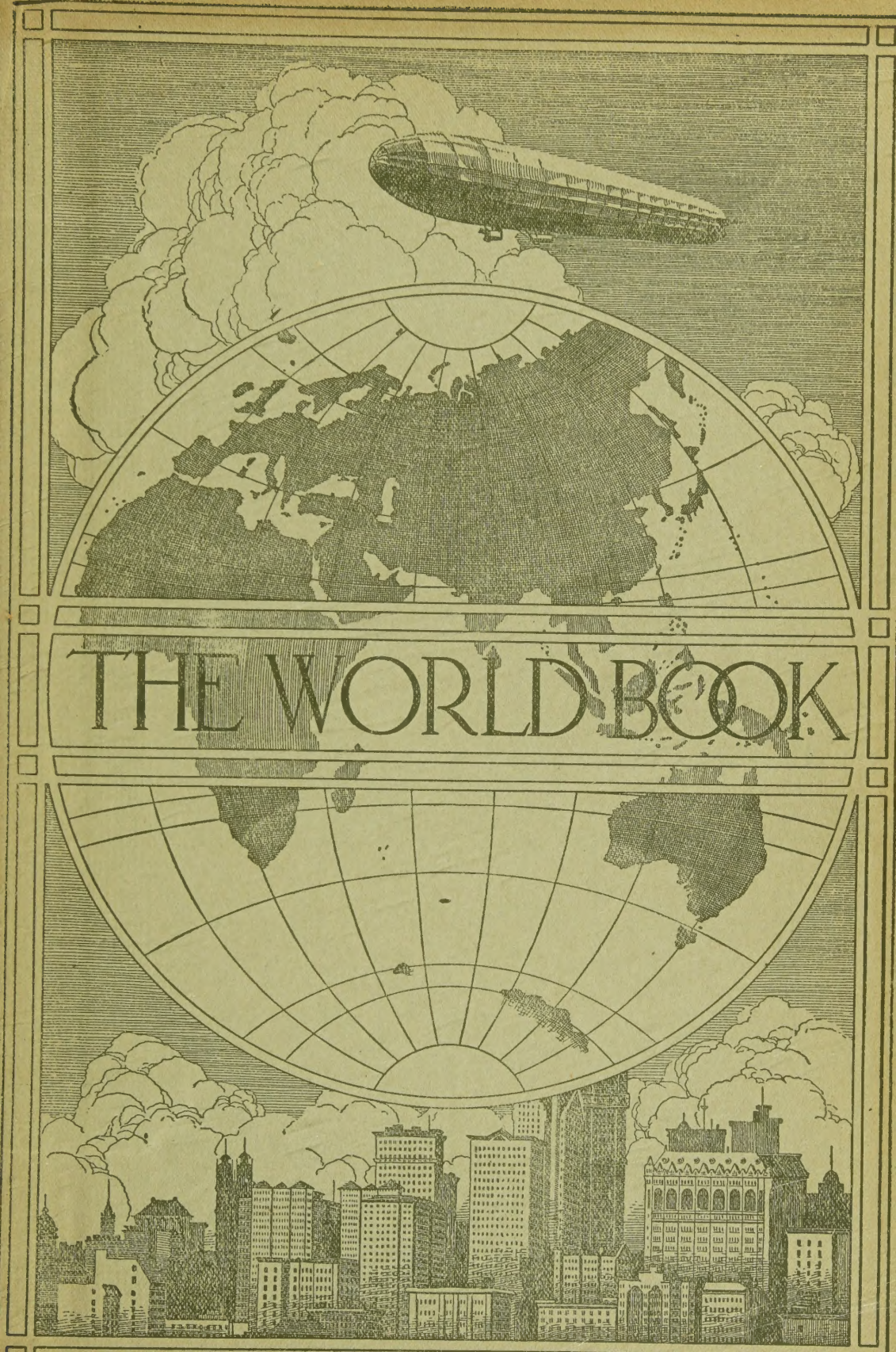
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